The Builder.

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Coombe Sydenham Manor-House.—Drawn by Mr. Roland W. Paul ..... *Single-Page Ink-Photo.*
Trull Church, Somerset: Roodscreen, Pulpit, Windows, &c.—Drawn by Mr. R. W. Paul ..... *Single-Page Photo-Litho.*
Taunton Castle: Courtyard and Gateway.—Drawn by Mr. R. W. Paul ..... *Single-Page Photo-Litho.*
Manor-House, East Quantockshead.—Drawn by Mr. R. W. Paul ..... *Single-Page Photo-Litho.*
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The Architecture of West Somerset.

NOT the least interesting feature of the architecture of Somerset is the even distribution of its interest. No portion of the county but will well repay the architect for visiting it, and the diversified country in which houses and churches are placed enhances their beauty and gives the district an additional interest. That portion of the county known as West Somerset,—roughly speaking, that which lies between the Parrett river and the northern half of the Devon boundary,—is of very marked value in its architecture. The Wells district is essentially an ecclesiastical one, the Yeovil district as essentially a domestic one, but the portion of the county for which, in a great measure, Taunton affords a convenient centre, is equally rich in both churches and manor houses. There is nothing of the grandeur of Brympton or Montacute, or anything to equal the glorious grouping at Wells, but the examples to be met with are extremely valuable, a value which is here very largely increased by the natural beauties of the scenery, showing clearly how ready and capable our forefathers were in taking advantage of their surroundings, and building in harmony with them. The presence of a coast-line is generally an important factor in the treatment of the architecture in its neighbourhood, and both hills and valleys have their influence. In West Somerset all are to be found,—the coast-line commencing with the flat country at the mouth of the Parrett, and finishing at the western boundary of the county in the lofty hills of Exmoor. A little way back from the coast and parallel with it are the Brendon Hills, while from its centre the Quantock Hills run southward, and bending east form a natural protection to the Vale of Taunton Deane.

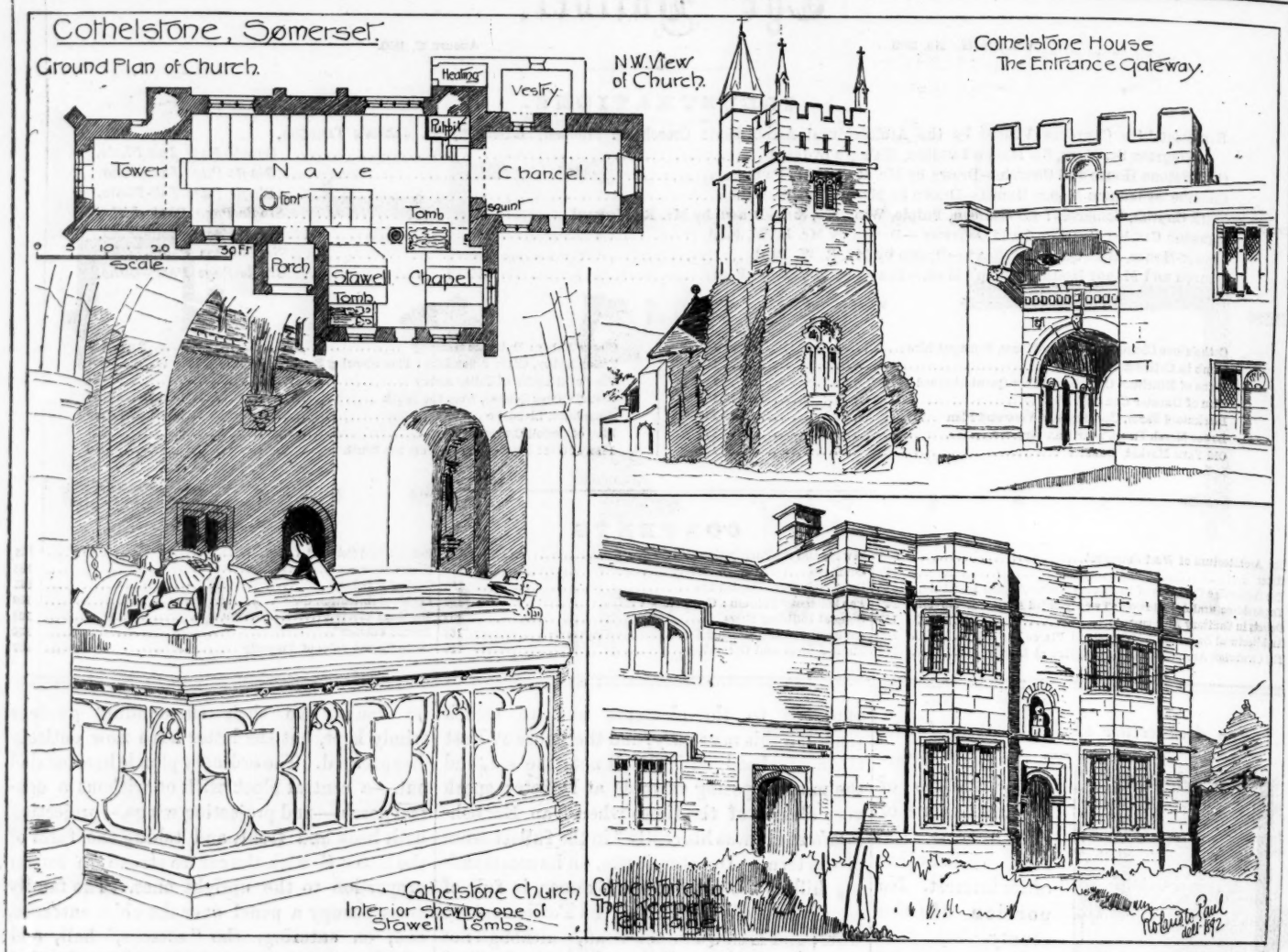
Taking the coast-line first, its architectural exteriors are simpler,—at times amounting to severity,—than those of the valleys. Its exposure to the elements and to attack rendered this necessary, and the house at East Quantockshead, on its knoll near the sea, and the more imposing example at Dunster, speak very clearly of the times when "an Englishman's house was his castle" in the fullest sense of the term. Dunster Castle, on its commanding hill at the entrance to Exmoor, is full of associations of the times of the Parliamentary wars; and East Quantockshead,—although not actually a fortress,—bears a distinctly fortified aspect, especially when seen from a distance. Further east were the castles of Stogursey and Bridgwater, both now little more than a name, but each playing their part in the history of the county.

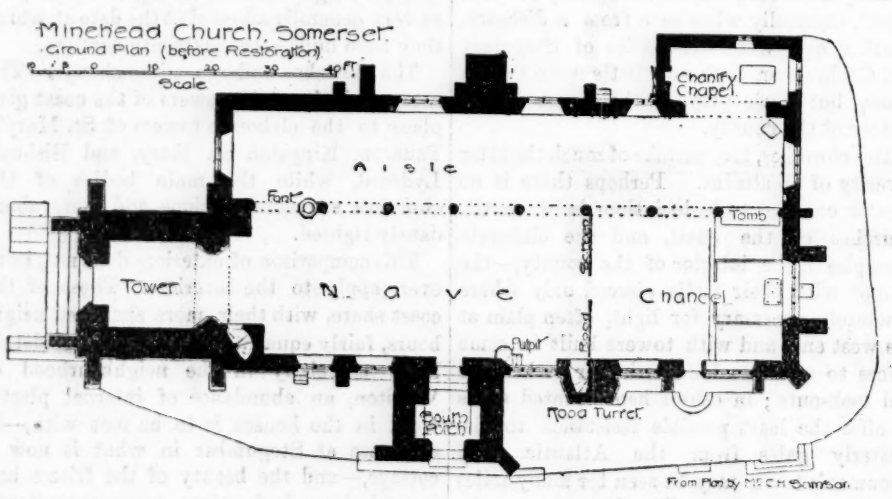
The churches, too, partake of much the same severity of treatment. Perhaps there is no greater contrast to be had than between the churches of the coast, and the elaborate examples in the interior of the county,—the former with their walls pierced only where absolutely necessary for light, often plain at the west end, and with towers built in some places to serve as landmarks, or as beacons and look-outs; in others kept stunted so as to offer the least possible resistance to the westerly gales from the Atlantic. St. Decuman's tower may be seen for many miles standing sentinel over Watchet, whereas the little churches of Quantockshead and Kilve are typical of those which seem either to crouch under the shadow of the manor house, or shelter themselves behind the sand dunes. Directly the coast-line is left and the valleys between the hills are reached, a very marked change occurs. Most of the Mediæval manor houses, as is well known, were built in the valleys in preference to more elevated situations, and the situation of Coombe Sydenham is an excellent example. This house,—a very interesting one,—is almost entirely surrounded by hills, in part densely wooded, and its gabled tower no doubt was built partly in order to command its only open side,—that towards the north.

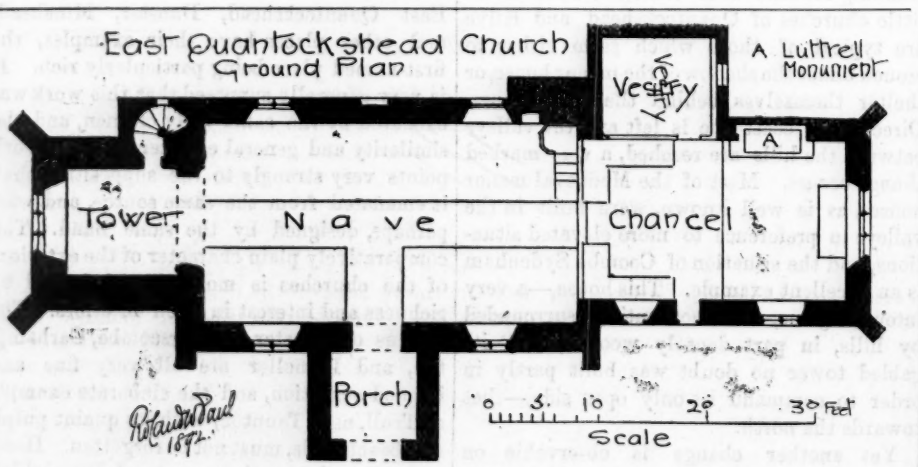
Yet another change is observable on reaching the Vale of Taunton Deane. Cothelstone and Bishop's Hull have little or nothing to suggest a fortified dwelling,—they stand as good examples of the residence of the more wealthy classes of the days of Elizabeth, and no doubt had their surrounding gardens trimly kept, but the latter have now entirely disappeared. The ordinary plan is here carried out,—a central block with or without a central porch,—and projecting wings,—projecting both back and front, and taking the form of the letter H with the centre stroke in longer proportion to the upright ones. The family arms occupy a panel over the chief entrance, and, on entering, the "screens," hall, and withdrawing rooms are arranged on the plan so very generally adopted at the date at which they were built,—the sixteenth century.

The churches undergo a like change. The comparatively plain towers of the coast give place to the elaborate towers of St. Mary's, Taunton, Kingston St. Mary, and Bishop's Lydeard, while the main bodies of the churches are more spacious and more abundantly lighted.

This comparison of exteriors does not, however, apply to the interiors. Those of the coast share, with their more sheltered neighbours, fairly equally in elaboration of detail. More especially in the neighbourhood of Williton, an abundance of internal plaster work in the houses is to be met with,—in one case at Stogumber in what is now a cottage,—and the beauty of the friezes and mantel-pieces is in some cases exceptional. East Quantockshead, Dunster, Minehead, and other places have their examples, the first-named place being particularly rich. It is very generally supposed that this work was executed by the same body of men, and the similarity and general excellence of the work points very strongly to the supposition that it emanated from the same source, and was, perhaps, designed by the same hand. The comparatively plain character of the exteriors of the churches is more than balanced by richness and interest in their interiors. The screens of Dunster, Timberscombe, Carhampton, and Bicnoller are all very fine and in good condition, and the elaborate example at Trull, near Taunton, with its quaint pulpit and bench-ends, must not be forgotten. Here, as in the neighbouring county of Devonshire, the bench-ends are a great feature. Some of the churches, such as Bicnoller, Bishop's Lydeard, Kingston, Sampford Brett, Cothelstone, Trull, and East Quantockshead are



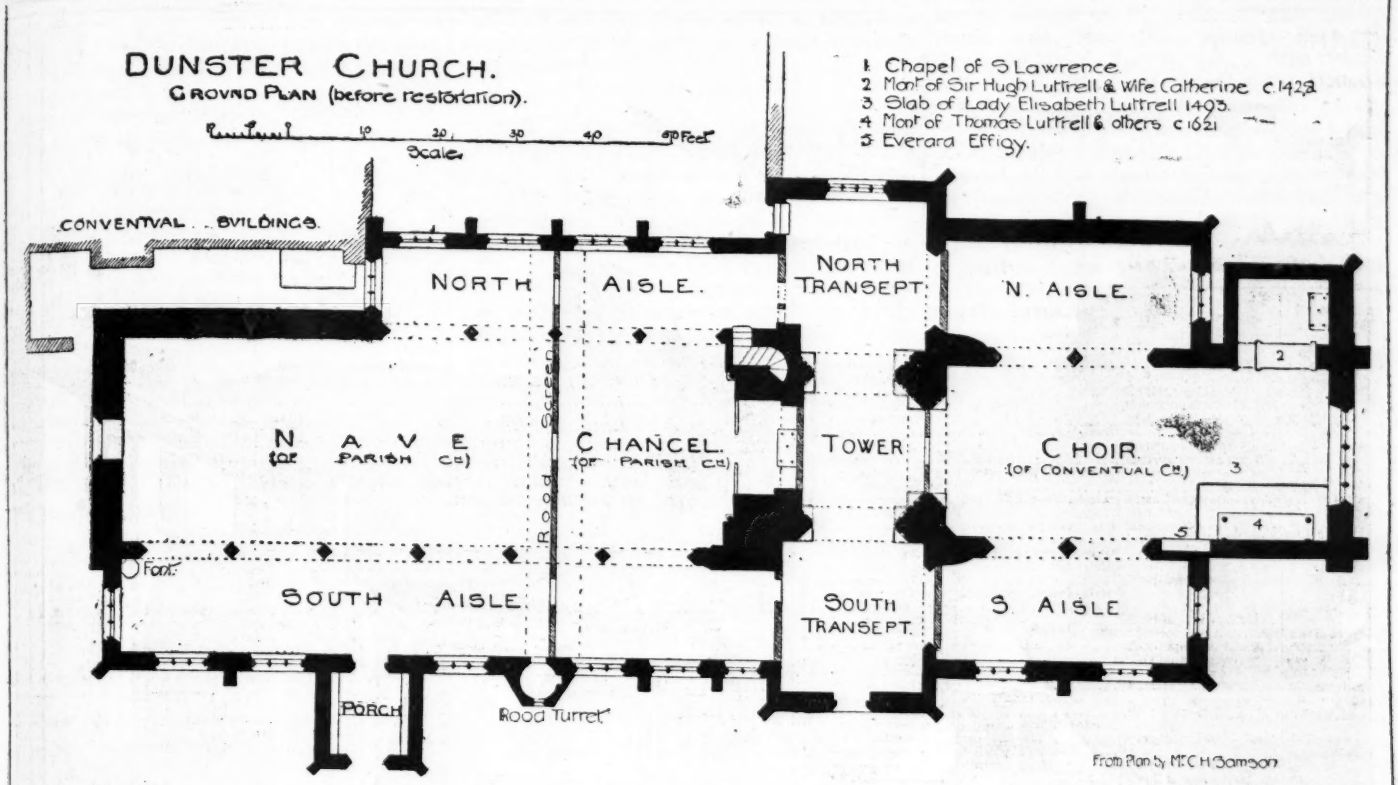


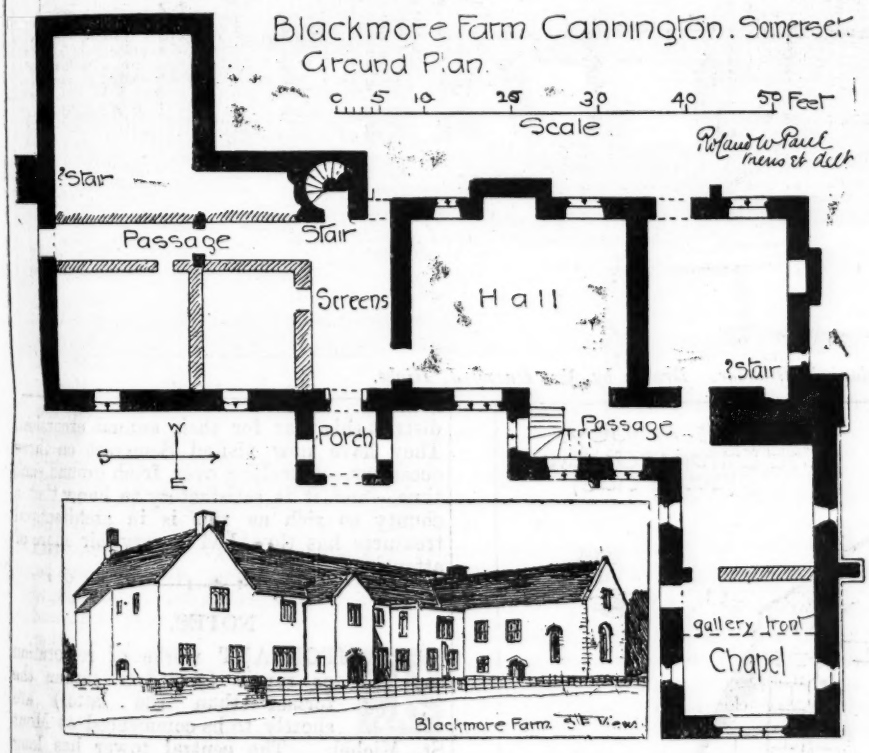


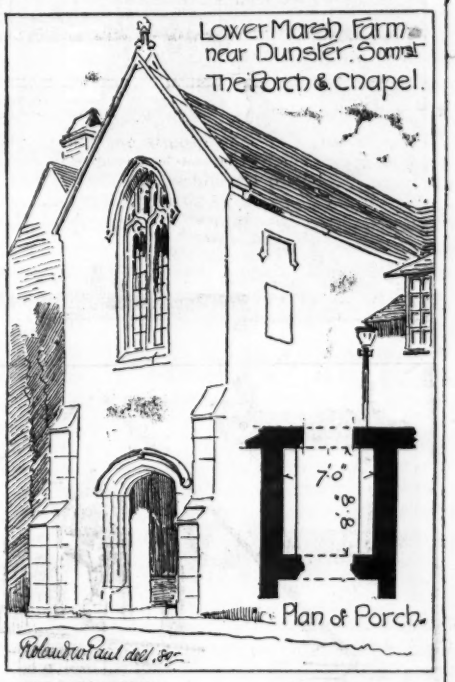
almost entirely pewed with their old bench-ends, many of them highly valuable in their heraldry and other carvings. At Cothelstone we find the arms of the Stawells, at Quantockshead those of the Luttrells, while at most,—particularly at Bicnoller,—are several very beautiful specimens of foliage, including the lilies in a pot, emblematic of the Virgin. At Bishop's Hull are some quaint figure subjects, and altogether these bench-ends are a study in themselves.

The mere mention of such families as Sydenham, Trevelyan, Luttrell, and Musgrave, Mohun and Wyndham,—names which are intimately associated with the ownership of the manor houses,—is a guarantee that the monuments in their several churches will be of historic interest and artistic value. The interesting series at Dunster, the Luttrell monument at East Quantockshead, the Wyndham tombs at St. Decuman's, and those of Musgrave and Sydenham at Stogumber, with Raleighs and Trevelyans at Nettlecombe, make a very good series of memorials of almost every kind, from the early slab and conventional cross-legged effigy to the richer examples of the Renaissance. A particularly beautiful slab of black marble to one of the Musgraves, now in the South Chapel at Stogumber, deserves especial notice for its lettering and the freedom of its lines and execution. Perhaps still more freedom is to be seen on a small mural monument in the nave of Creech St. Michael to a member of the Trivitt family. Delicacy of engraving on marble could probably go no further. Fonts and pulpits are varied,—an elaborate font is found at St. James, Taunton, others of a good kind at Minehead, Stogumber and Nettlecombe, this last example partaking more of the Norfolk character in having the seven sacraments carved on the sides of its bowl. A fifteenth-century stone pulpit occurs at Stogumber, and elaborate wooden ones at Bridgwater and North Petherton. The wood roofs are in many cases remarkable for the richness of the cornice covering the wall-plates, very good examples occuring at St. Decuman's, Cleeve, and Creech St. Michael.

Two other points remain to be noticed,—the monastic establishments and the chapels attached to the manor houses. In the first category Cleeve Abbey takes the first place,—a beautiful example of the domestic portion of a Cistercian monastery standing almost complete, and in good preservation.







It has been cleared of the farm rubbish which had accumulated in its beautiful cloister quadrangle, and stands both as an example of beauty of workmanship, beauty of situation, and of the loving care which has been bestowed upon it by its owner in recent years to keep it as far as possible from further desecration. Cleeve Abbey has been so often described that it is almost needless to do so here, but no visitor to it will omit to notice its gateway, its refectory, and the tile pavement which was found on the site of the church, and in the domestic buildings*

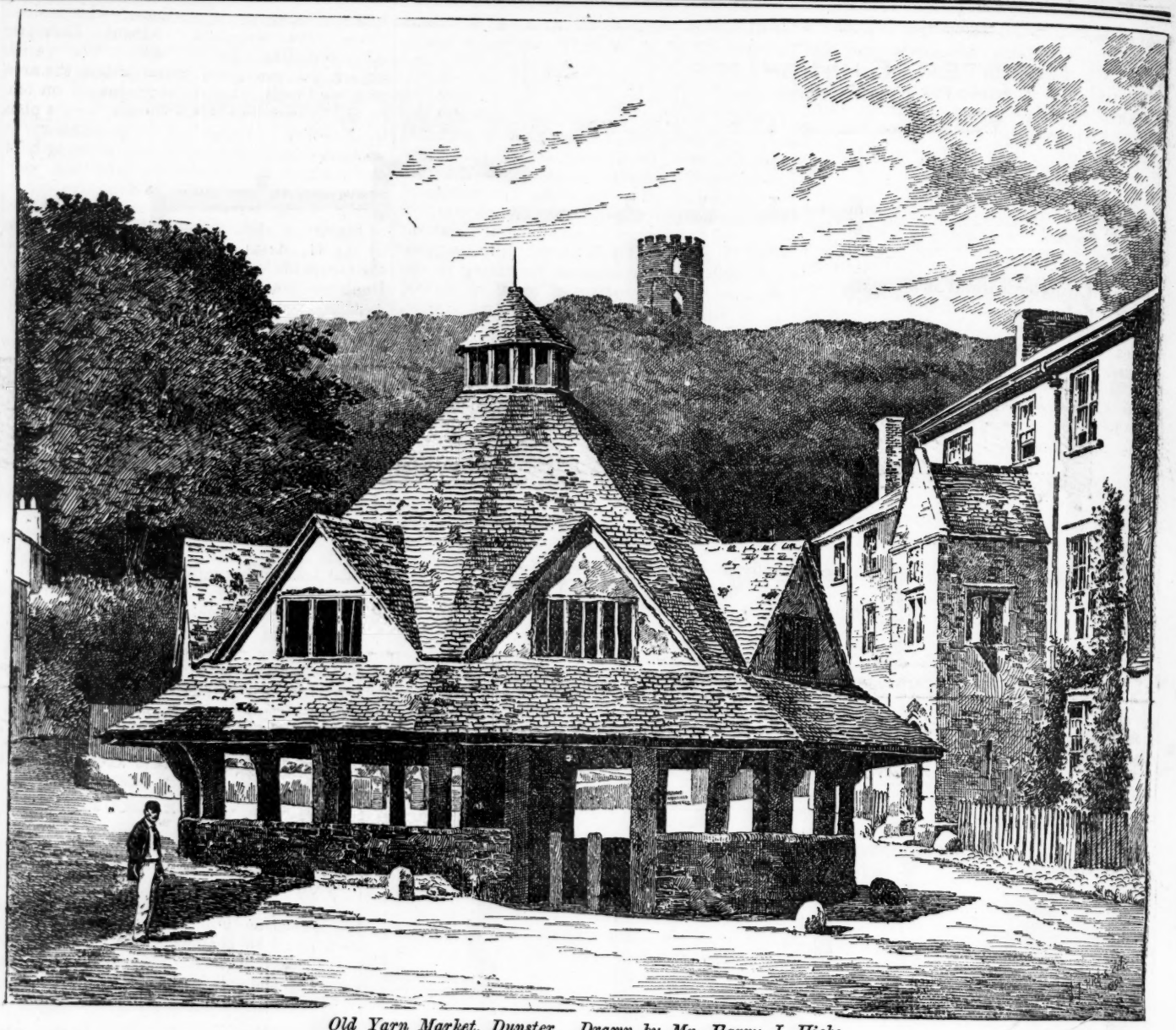
Of lesser monastic houses, we have Dunster, Kilve, Bridgwater, Cannington, and Taunton. Dunster Church, as at Arundel, retains under one building the double altar,—parochial and conventual,—the former under the tower, the latter at the extreme east end. Kilve Priory is but a shell, but with some interesting detail in the windows; and all that is left of the Priories of Bridgwater and Taunton are a doorway and barn respectively. Cannington Priory has been much altered and rebuilt, but has some interesting late work near the church, which in itself is an interesting building.

Of chapels attached to manor houses there are three interesting examples,—namely, at Blackmore Farm, Gurney Street (both near Cannington), and Lower Marsh Farm, near Dunster. The former is the most important, both as regards size and preservation, and, in addition to its altar niches, preserves an upper gallery, which projects on the first floor level into the chapel, and which was used by the owner and his family, the retainers occupying the space on the ground floor underneath. At Gurney Street the chapel is smaller, with a panelled ceiling, and at Lower Marsh Farm it is over the porch.

At Taunton itself there is much of interest. The Castle, with Norman work and later additions, its picturesque southern entrance and the memories of Judge Jeffreys and the horrors of the Bloody Assize, are all points that claim notice. Taunton was not a walled town. There were apparently "gates" at the principal road approaches to the town, but nothing of the nature of a complete enclosing wall. Besides the Castle and the two parish churches of St. Mary and St. James, there are the remains of the Priory; the Grammar School (opposite the Castle), founded by Bishop Fox, of Winchester, and bearing his arms; the Almshouses, known as Greys, in East-street, a solid-looking brick building, with sturdy chimney stacks; and the more humble, but more ancient, Almshouses at the extreme eastern boundary of the town, with the initials and mitre of Richard Beere, Abbot of Glastonbury.

Enough has been said to show that this portion of Somerset is very full of interest, and justifies the selection which the Architectural Association has made in choosing the

* Tiles of similar pattern occur at Dunster and St. Decuman's,—the latter a good series.



Old Yarn Market, Dunster. Drawn by Mr. Harry J. Hicks.

district this year for their annual excursion. They have now visited Somerset on three occasions,—travelling over fresh ground each time,—and it is satisfactory to know that a county so rich as this is in architectural treasures has thus had a very fair share of attention.

NOTES.

IMPORTANT works of restoration or repair (we fear rather the former than the latter) are shortly to be commenced at Mont St. Michel. The central tower has long been in a dangerous condition, and will have to be to a great extent rebuilt, the scheme for the work presented by M. Petitgrand, the present official architect in charge of the structure, having been approved by the Commission des Monuments Historiques. The proposed operations include, in the first place, the repair of the foundations of the four main piers of the crossing; secondly, the taking down entirely of the upper stage of the tower and its reinstatement "dans son aspect d'autrefois"; in other words, the seventeenth century portion of the tower is to be removed altogether, and to be replaced by a restoration of the original Romanesque termination. It will be crowned by a slated conical roof, somewhat higher than the existing one. This work is also considered to render necessary the reconstruction of the adjacent portions of the nave and choir. Those who have not visited Mont St. Michel had better therefore lose no time in doing so, if they want to see it before it becomes a modern imitation of Early Gothic. The work will take about four years, and as funds for it are insufficient, it is proposed to exact a small entrance-fee

from visitors, to go towards the expense of the work. This is the last straw, one may say. It is bad enough to behold the spectacle of the transformation of such a monument into a modern "restoration," without being made to contribute to the funds for carrying it out.

IN Berlin and Vienna it has for some time been taken for granted that the cholera epidemic in Russia is more wide-spread than the official reports published at St. Petersburg will have it. After careful investigation on the part of the Governments having their seats in the two capitals first named, it was decided that not only must the preventive measures taken at the frontiers for the purpose of avoiding an introduction of the plague be enforced, but that preparations must be made in the cities and towns to enable them to resist the epidemic if it chances to pass beyond Russian territory. Whilst publicity has been intentionally given to measures in force on the frontiers, it has been made a matter of principle to go about the preventive measures inland as quietly as possible, with a view to avoid panic. In the eastern provinces of Germany and Austria the authorities are having the the greatest difficulty in improving the state of the filthy towns in Galicia, where typhus epidemics have their home. Whilst in Berlin everything is now ready in case of an emergency, matters are not quite so well forward in Vienna, although even there the continual sanitary inspections render good service. As to Berlin, it would be well to note what great stress is laid on good scavenging, a matter almost neglected in Vienna; and as the cleanliness of the thoroughfares in the Prussian capital is generally good, it is now quite a pleasure to see the pavement of even the smallest bye-street. Berlin is of course in every way better prepared to meet an epidemic, owing to the absence of all slums, its good drainage system and water supply, and last, but not least, the smoother kinds of paving. We have on a former occasion noticed that these every-day matters have not received proper attention in Vienna, points which will probably be sadly felt by the inhabitants in case of mishap. Speaking of the large cities farther east than Berlin and Vienna, *i.e.*, Breslau and Budapest, it is in the former in which a case of *cholera nostras* has already occurred, where an epidemic is most to be feared. The Hungarian capital, by the bye, can pride itself on having its sanitary condition on a far higher level than the not very dissimilar city of Warsaw, which latter place can, however, boast of a perfect drainage system.

NOW that the Judicial Committee of the Privy Council has approved both the form and the substance of the judgment of the Archbishop of Canterbury as to the Bishop of Lincoln's case, it may be well to note the important part which archæological and artistic matter played in the judgment. If anyone will refer to the "Authorised Library Edition of the Bishop of Lincoln's Case," published by Messrs. Clowes & Sons, of Fleet-street and Charing-cross, and will cast his eye over the appendix to the Archbishop's judgment, in which are collected the various materials as to lights and the position of the altar, he will note how largely the Archbishop has drawn for his conclusion on various pictorial representations or archæological data—as, for instance, those to be found in the publications of the Chetham Society, or, to take a particular instance, the woodcuts in Melancthon's "Formæ Precationum." History, whether general or ecclesiastical, does not live only in books, and this case is an instance of the value of pictorial representation as an element of history. It is a mistake to think that the above publication has no interest for any except the clergy, and it should be placed at once on the shelves of the Library of the Institute of Architects, if it is not there already, for it is likely to become a scarce publication.

THE *Academy* states that subscriptions amounting to 215*l.* are already promised towards the Lowell memorial. It is proposed to fill in with stained-glass the two windows in the vestibule, Westminster Chapter-house. Upon the completion, in 1873, of the late Sir Gilbert Scott's restoration, Dean Stanley entered into a project with the Government for filling in the windows, at an estimated cost of 6,000*l.* out of the National Exchequer, and Messrs. Clayton & Bell were entrusted to carry out the work. The late Dean got many fine words from successive Administrations, but a few weeks before his death (July, 1881) was informed that he could not have the money. Thereupon, from out of the surplus of the Stanley Memorial Fund, the smaller window above the entrance from the vestibule and two of the larger windows were filled in, and other windows were presented by the Queen and by some subscribers in the United States, in addition to one set up by Stanley and his friends. So one large window,—for which the design is already prepared,—and the vestibule lights, remain for the accomplishment of Dean Stanley's scheme.* It is appropriate that James Russell Lowell should thus be commemorated by Englishmen in our country, where, during his sojourn as Minister for the United States, he himself fitly played the leading part in the dedication of memorials to past literary worthies, including, in the Abbey, the busts to Coleridge and Longfellow, by Messrs. Hamo Thornycroft, R.A., and T. Brock, R.A., respectively; and Sir A. W. Blomfield's monument, with a bust, to Pepys in St. Olave's, Hart-street, E.C. On November, 8, 1884, we published an engraving, executed by Mr. Cooper, of the Stanley monument set up in Henry VII.'s Chapel, at a cost of 2,100*l.*, its pedestal designed by Mr. J. L. Pearson, R.A., and the effigy executed by the late Sir Edgar Boehm, R.A.

IN avoiding one danger we are apt sometimes to incur another. The municipal authorities have for sanitary reasons, quite rightly, insisted that rain-pipes shall not discharge direct into the sewers, and that drain-pipes shall be ventilated by stack-pipes carried up to the roof. Mr. W. H. Preece pointed out last week, at the British Association meeting, that the former of these regulations, as usually carried out, deprived the house of a most efficient lightning-conductor, to the existence of which he mainly attributes the remarkable immunity of private houses from damage by lightning; while a metal stack-pipe, connected, perhaps, with an earthenware drain-pipe on the first-floor, would be a positive source of danger in a thunderstorm. Happily the remedy is easy; it is only needful to introduce a metallic connexion between these pipes and "earth," and they serve as well as ever as lightning-rods, without in any way contravening the new sanitary regulations.

DANBURY-PLACE, together with its park of 300 acres, on the road from Maldon to Chelmsford, was bought by the Ecclesiastical Commissioners in 1845, for 24,700*l.*, as a palace for the Bishops of Rochester. It stands on the site of a house built by Sir Walter Mildmay, of Apethorpe (*obiit* 1589), and devised by him to his second son, Humphrey. In Thomas Wright's "Essex," 1835, we read that the former house had then been lately pulled down, and that Mrs. [*sic*] Round had designed its successor. It is stated that the Duke of Argyll is about to purchase the property as dower, he being a connexion by marriage of the late Dr. Claughton, formerly Bishop of St. Albans, who resided there, and the St. Albans Bishopric Act providing for a sale. The parish church and graveyard stand within the area of a reputedly Danish fort, situated on one of the loftiest hills in the county,—see a plan in Morant's "Essex," 1768. Danbury is scheduled in Domesday Survey as being held by Geoffrey de Mandeville, who had succeeded to all the lands held by Asgar, in virtue of the latter's office as King's Stalre, or Master of the Horse. Possessed in turn by the St. Cleres, the Veres Earls of Oxford, the Greys of Wilton, and the Lords D'Arcy, Danbury was given by Edward VI. to William Parr, Marquess of Northampton, who alienated it to Sir Walter Mildmay. In Bycknacre, a sub-manor, standing partly within this parish, Maurice FitzGeoffrey founded, *temp.* Henry II., a priory for black canons, which Sir Henry Mildmay bought in 1548. Views of the ruins, and of Danbury Place, are given in Wright's work.

* See our illustrations of the vestibule and the great doorway, March 7 and 14, 1885, from Mr. Ernest C. Shearman's measured drawings.

IT is desirable that the case heard at the Marylebone Police-court this week in regard to the non-performance of sanitary work to a house after due notice should not be lost among the daily records of the Police-courts. The Vestry of St. Pancras ordered the defendant, the landlord of the house, to put the drains into repair, as they were in a very defective condition. Some work was done outside the house, but none inside. The defence of the landlord was that he had instructed a builder to do what was necessary; but the builder stated that he had done such work as he was ordered to do. The result was that the defendant was ordered to complete the work at once, and also to pay a fine of 5*l.* and costs. It cannot be too often repeated that the Public Health Acts and the Metropolitan Management Acts now give complete power to local bodies over landlords who neglect their duties in regard to a defective sanitary condition of their premises. This conviction will also serve as a useful object-lesson to persons who try to slur over work to save money. Thoroughness is the cheapest in the end.

PICTURESQUE Nuremberg has of late (says a correspondent) been greatly spoilt by the hideous erections put up by jerry builders or by so-called architects who like to see a cold, typical Renaissance façade placed next to some pretty piece of the old fortifications. The police authorities have now prohibited the further erection of these eyesores, and have published some regulations which will require architects or builders who may put up new façades to take the surroundings into consideration. As a rule, the style predominant in the city is to be used when designing future buildings, exceptions only being granted where it is impossible to combine these artistic requirements with the purpose of the new erection.

THE *Standard* last week announced that some articles have been accidentally dug up from a depth of 6 in. or 7 in. below the surface in Parliament Hill-fields, Highgate. They are described as comprising two "pilgrim's bottles" of foreign manufacture, about 300 years old; a silver cup of English make, about 200 years old; and two candle-holders, silver, weighing nearly 60 oz. in all. These, we surmise, may perhaps be the proceeds of a robbery, since the local history suggests little to connect the treasure-trove with the site, unless it had been left there by some of the "No Popery" rioters who gathered at the "Spaniards" Inn to attack Lord Mansfield's house in Caen Wood. Parliament, otherwise Traitors', Hill, takes its name, as some say, from an artillery battery fixed there during the Civil War; or, according to others, from the meeting there of Guy Fawkes's fellow-conspirators in order to witness the destruction of Parliament House. An eminence in the grounds belonging to Baroness Burdett-Coutts is also said to have

been chosen for that purpose. The conspirators fled for refuge first to Caen Wood. The hill extends over 200 acres, and belonged until lately to Lord Mansfield. In 1884 a project was started for acquiring the land, together with the adjoining East Park Estate (sixty acres), owned by Sir Spencer Maryon Wilson, as an open space. An Act of 1886 enabled the late Metropolitan Board of Works to carry out the purchase, and on March 6, 1889, the sale, for 302,000*l.*, was finally ratified, the ratepayers contributing one-half of the money, and the Charity Commissioners 50,000*l.* Thus have been preserved the tumulus said to cover the slain in a battle between the inhabitants of London and a band who had advanced through the northern forest from St. Albans; and the sources of the Fleet in a valley westwards of the hill. The Highgate ponds were made under a scheme of William Paterson (founder of the Bank of England), to collect the springs of Caen Wood as a water supply for northern London (1690); the Hampstead ponds were formed about the same time for a similar purpose as regards the City. The "upper" and "lower" ponds are cited among the copyholds of a terrier of Hampstead Manor, referred to by J. J. Park in his work upon Hampstead (1818) as "taken about the end of the seventeenth century."

AUSTRIAN architects, together with the civil engineers of that country, apparently wish to improve their status and to exert their influence in matters relating to technical training. They have sent a petition to the Government praying that certain examinations may be officially recognised, and, further, they have asked for votes in the election of the Principals of the Royal Technical College and the School of Mines. Among the minor points of the petition is the question of having technical *attachés* at various Legations, which has lately come to the front. That the requests are by no means the most modest will be seen when one reads that the number of *attachés* is to be seven, and that these representatives are not all to be stationed in modern capitals, but one of them in the East. The purport of the petition was framed with the sanction of the "Congress of Architects and Engineers," held last month.

A DISCUSSION on electrical units has become a regular feature of the British Association. In this matter there is "safety in numbers," and the divergence of opinion amongst reformers is the most hopeful sign for those who with Dr. Hopkinson "hope that electricians will be cautious in adopting new units, or altering old ones." Dr. Oliver Lodge's suggestions, though moderate and reasonable by comparison with those urged on him by Mr. Heaviside (in a letter recently published in *Nature*) are still open to criticism on several points. It would no doubt be convenient to have a proper name for the unit of magnetic flux, instead of the infinitesimal "line of force" which now occupies the field; but surely a better name might be found than the "weber," which not long ago was used for the present "ampere." We might even adopt Mr. Swinburne's suggestion, utilise the neglected Poggendorf, and call it the "pog." Most electricians, too, would far rather have to say "micro" a few thousand times more in their lives than have the system they are used to upset and their text-books and tables rendered obsolete by changing the microfarad into the farad. But by far the most objectionable proposal is to call the Board of Trade Unit a "kilowatt;" this is a distinct and avowed concession to ignorance and inaccuracy; it is as though we should bring out a new edition of Mrs. Shelley's romance with the name of Frakenstein transferred to the monster, or print in future editions of Pope

"A little *knowledge* is a dangerous thing"

as a concession to persistent misquotation Lastly, it hardly needs a resolution of Section A to recognise the ampere-hour as a convenient unit of quantity, for it is generally so recognised already, and there is a charming absence of conventionality about the resolution, "That the handiest size for the gauss is one ampere-turn." On the whole, Lord Melbourne's oft-quoted question, "Why can't you let it alone?" is most pertinent to this discussion.

THE CAMBRIDGE CONGRESS OF THE ROYAL ARCHÆOLOGICAL INSTITUTE.

THE opening meeting of the annual congress of the Royal Archæological Institute of Great Britain and Ireland took place at the Guildhall, on Tuesday, the 9th inst. The building is a dreary, ugly-looking structure, reminding one rather of a suburban railway station than of the municipal buildings of a town like Cambridge. We sincerely hope the day is not far distant when a Guildhall worthy of the University town will be erected.

Punctually at noon, the Mayor, accompanied by Earl Percy, the President of the Institute, and followed by the members of the Corporation of Cambridge, the Vice-Chancellor of the University, and other distinguished gentlemen, filed into the reception-room of the Guildhall. The Mayor, on taking the chair, said a few words of welcome to his guests, and the Town Clerk read an address which expressed the great satisfaction of the Corporation that the Royal Archæological Institute had honoured Cambridge with a visit. The Vice-Chancellor, on behalf of the University, and Professor E. C. Clark, on behalf of the Cambridge Antiquarian Society, spoke of the honour conferred on them by the visit of the archæologists. Earl Percy, after expressing his thanks to the Municipal and University authorities for the hearty reception afforded to the members, commenced his address by referring to the immense advantage the two great English Universities had over those in any other country in the world. He spoke of the associations and invaluable records of both Cambridge and Oxford. Passing on to the work of local societies, he suggested they might do much by directing and encouraging those who, though often ignorant of archæology, were yet willing to help in the repair of our monuments of the past. He thought they might also help in the direction of excursionists who visited their neighbourhoods. With regard to excavations, he strongly urged they should not be undertaken except under skilled and competent supervision, for the improper digging into a tumulous or earthwork often destroyed evidence as to its origin and date. He concluded his address by suggesting a system of better concentration between the local and central societies in London. Perhaps some might consider this a rather Utopian idea, but he hoped to see it carried out.

At 2 p.m. the members met in the new Lecture-room of Physiology to hear Mr. J. W. Clark's opening address as President of the Architectural Section. The learned lecturer had prepared a large plan of what Cambridge was supposed to be before any colleges were founded. He then proceeded to place on the plan pieces of coloured paper, showing the dates and positions of the various collegiate buildings, thus making it perfectly easy for his audience to see at a glance how and when the colleges had been founded. The lecture was intended to serve as an introduction to the subsequent inspection of of the town, and we can hardly imagine a better mode than that adopted by Mr. Clark. Later on in the afternoon Peterhouse, Little St. Mary's, Pembroke, Queen's, St. Catharine's, and Corpus Christi Colleges, and the Church of St. Benedict, were inspected under Mr. Clark's guidance. There was a general opinion among the members that the stained glass in Peterhouse was most unsatisfactory, and the Rev. Precentor Venables said the glass in question was of a style that ought always to be avoided. The contrast between the windows of Peterhouse chapel and the great east window of Little St. Mary's was remarkable. In the latter the colour and design were all that could be desired, and reflected great credit on the artist. Mr. Micklethwaite spoke at some length on the Saxon Tower of St. Benedict's Church, and Precentor Venables drew attention to the long-and-short-work at the east end of the nave, thus showing that the Saxon nave was the same length as the existing one.

In the evening Mr. E. M. Beloe read a paper on "Castle Rising," and Mr. E. Peacock communicated an interesting little account of the history of the custom of "Borough English."

On Wednesday, August 10, the members drove from Cambridge to inspect the Dykes on the road to Newmarket. These interesting earthworks were fully described by Professor E. C. Clark, who pointed out that both Balsham Dyke and the Devil's Ditch commenced in the woodlands and ended in the Fen country, thus making a perfect barrier against an invading force. The ditch in both cases was on the south-west side of the mound; he therefore concluded these earthworks were erected against an attack by an enemy from that quarter. Professor Clark also pointed out where the Roman-road, probably the Via Devana, crossed the Icknield Way. At Newmarket railway station the members left their carriages, and, after luncheon, they proceeded by train to Bury St. Edmunds, where they were received by Mr. E. M. Dewing, who acted as an able guide to all the places of interest in the town.

In the evening the Bishop of Peterborough opened the Historical Section in the Guildhall.

On Thursday morning the usual business meeting of the members of the Institute was held in the Guildhall. Though the proceedings were entirely of a private nature, and only members were admitted, it soon became generally known that Earl Percy, who for nine years had so ably directed the business affairs of the Institute, had resigned the post of President. It is needless to state that a feeling of deep regret was prevalent among the members on account of the step his lordship had felt bound to take. Those who, under his Presidency, have joined in the annual excursions, will long remember the courtesy and kindness he manifested both to members and visitors, and the great interest he took in the proceedings. We understand that Viscount Dillon has been elected as his successor, and we feel sure the Institute will, under the guidance of so eminent an antiquary, continue the good work it has so well executed in the past. It also transpired that the annual meeting next year would be held at Dublin. This decision of the members has met with great satisfaction, for though the name of the society is the "Royal Archæological Institute of Great Britain and Ireland," no visit has yet been paid to the sister isle. It is proposed to hold the Jubilee Meeting of the Institute in London in 1894, and we understand that negotiations have already been opened with the various London authorities in respect of the projected gathering of archæologists in the Metropolis.

Immediately after the conclusion of the business meeting, Mr. C. D. E. Fortnum opened the Antiquarian Section, and spoke at some length on the development of museums in this country. His address was followed by a learned paper on the Cambridgeshire Dykes, by Professor W. Ridgeway.

In the afternoon the members assembled within the gateway of King's College, and proceeded to the glorious chapel, which, perhaps not improperly, may be considered as the gem of Cambridge architecture. Sir George M. Humphry, in his "Guide to Cambridge," thus commences his description of the building:—"The Chapel, with its fine proportions, noble windows, gigantic but elegant buttresses, beautiful turrets, and boldly designed parapet, is truly a royal structure." The windows contain probably the finest specimens of glass painting in the country. Thankful must we be that they were not destroyed during the troubled times of the Civil War. They probably owe their preservation to the excellent terms that existed between the College authorities and the soldiers that were quartered there. Many of the members availed themselves of the opportunity afforded to them of mounting to the top of the chapel and there making an examination of the construction of the groined roof and of the timber roof above it. We do not here propose to enter into a detailed description of this College, or of the other buildings in Cambridge, for we are confident they are well known to the majority of our readers. Our business here is to record the proceedings of the Institute. After spending a considerable time in King's College, the members visited Clare College, Trinity Hall, and Trinity College. The party, as on the opening day, was under the direction of Mr. J. W. Clark.

In the evening a *conversazione* was held in the

Guildhall, the Mayor of Cambridge receiving the visitors. During the evening Professor E. C. Clark read an elaborate paper on "English Academical Costume." He commenced his discourse with a history of the rise of the university system, and traced out the origin of the various costumes of the college dignitaries, and the alterations that had been effected from time to time during the Mediæval period. Not the least popular part of the entertainment was the selection of excellent music, arranged and performed by the Borough Organist, in the large hall.

On Friday, August 12, at 10 a.m., Mr. J. W. Clark met the members at St. John's College. One of the chief features of attraction here was the gallery, now used as a Combination room. In the hall is a portrait of Professor Palmer, who came to an untimely end in Egypt. He is dressed in Oriental costume. An amusing story is told about this picture. Some years ago an American, who had been "doing" Cambridge, greatly admired the portrait of the Professor, and was aftewards heard to say that the picture he liked most at St. John's College was that of "St. John the Baptist." Mr. Clark told the members that the library was without doubt the most beautiful room of its sort in the University. The book-cases are arranged according to the mediæval custom,—*i.e.*, projecting from the wall towards the centre of the room. At the end of each case is a catalogue of the books to be found there. Sir Christopher Wren was the first architect to upset this Mediæval arrangement of libraries, and to place the bookcases against the walls of the room.

The Round Church, or Church of the Holy Sepulchre, was next visited. Mr. J. T. Micklethwaite said this was an excellent example of the exceedingly rare buildings known as round churches. Only four existed in England, although there are examples in other countries. Those in England are the Temple Church in London, and the Round Churches at Cambridge, Northampton, and Little Maplestead. These buildings did not necessarily owe their origin to the Knights Templars. The Cambridge and Northampton examples were decidedly parish churches. Mr. Micklethwaite said that the church in which they were then assembled had been the victim of early restoration. It had originally a fifteenth-century tower, which was remarkably picturesque. This was ruthlessly removed at the restoration. Precentor Venables said its removal had been requisite in order to save the substructure from ruin, but in this Mr. Micklethwaite did not agree. He said he did not blame the restorers of 1841; when the church was in their hands no doubt they had acted according to their lights, but he did blame those who, after fifty years of archæological education, still persisted in the destructive policy. The painted glass in this church is most objectionable. The windows being small, and the colours of the darkest, the light is almost obliterated, and many of the beautiful details are not easily seen.

Jesus College was subsequently inspected, under Mr. J. W. Clark's able guidance. He said it was the only example in Cambridge of a religious house being transformed into a college. It has, therefore, several peculiar features. It is situate remote from the street, and the principal quadrangle is surrounded by cloisters. The building originally belonged to the Benedictine Nunnery of St. Rhadegund. In the latter part of the fifteenth century the religious house was dissolved, and Jesus College was founded on its site. John Alcock, Bishop of Ely, did considerable damage to the church by transforming it into a chapel in order to suit the new state of affairs. On leaving Jesus College, the party proceeded to Christ's. The Vice Chancellor met the members at the private garden entrance, and took them past the swimming-bath, charmingly situated with many an overhanging tree, through the well-cared-for gardens to the College. It was founded in 1505 by Lady Margaret Beaufort. The hall was restored a few years ago, but all the original features were preserved. Mr. Clark called attention to the communication between the Master's lodge and the upper end of the hall, proving that the design was taken from that of the ancient manor-house, where the lord's entrance was always at the upper end of the hall. In the Combination-room the members were allowed to inspect the College plate, which an expert pronounced as the finest in Cambridge. The University Library was next inspected, and, lastly, Gonville and Caius College, where the Gate of Honour was much admired. It was through this gateway the students passed when, having been successful in their examinations, they were about to take their degrees.

The afternoon was devoted to an excursion to Audley End and Saffron Walden. At the former place the party was received by the noble owner, Lord Braybrooke. On assembling in the great hall Mr. Longden read a paper by Mr. J. Alfred Gotch, who, unfortunately, was unable to be present. Audley End, grand as it is, is now only about a third of its original size. Formerly it was a palace, now it is only a magnificent mansion. It was built in 1614 by Thomas Howard, and is said to have taken thirteen years in erection. It is essentially of Jacobean character, and was designed by John Thorpe. For some years it was used as a royal palace. In 1721 the Earl of Suffolk, finding the place too expensive to keep up, demolished a large portion of the buildings. In the saloon are several fine portraits; the most remarkable are those of Lord Chancellor Audley, Margaret (his daughter), Henry VIII., Thomas fourth Duke of Norfolk, Thomas Earl of Suffolk, Queen Elizabeth, and Elizabeth, Countess of Portsmouth. In the library the mantelpiece is a good specimen of Jacobean work, and in an adjoining room is an interesting full-length portrait of George II. by Pirie. The museum was, however, the chief place of interest to the archæologists. The only regret they had to express was that more time was not at their disposal to examine the interesting pre-historic remains contained in it. It would not be fair to conclude this short and imperfect account of Audley End without referring to the collection of natural history objects contained in the house. The ornithological department, we believe, is one of the most perfect collections of British birds in private hands. All the specimens are well-arranged, and deserve a close inspection by the visitor. The Institute owes a deep debt of gratitude to Lord Braybrooke for so kindly throwing his house open to its members.

Though many were unwilling to leave this interesting and historic place without further examining its treasures, yet they were obliged to hurry off at the appointed time to drive to the charming little town of Saffron Walden. If the antiquities of Saffron Walden are not of the highest order, they are certainly of sufficient interest to warrant an inspection by the Archæological Institute. Moreover, no one would regret a visit to this little town, whose situation renders it one of the most picturesque places in Essex. The party was placed under a local antiquary, Mr. Edward Taylor, who acted as guide and conducted the visitors to the chief objects of interest in the town. The earthworks, known as the Repell Ditches, were first inspected. In a meadow adjoining, 150 skeletons were discovered in 1876. A short description of these interesting earthworks was made by Mr. Taylor. The party then inspected the exterior of an old house in Church-street, known as the Sun Inn. Little seems to be known about the history of the building. It is a long building with seven gables. In the centre is the date 1676; the whole of the upper portion of the house is covered with elaborate designs in plaster work. In one gable are plaster reliefs of two men, with a large round disc between them, supposed to represent the sun, the sign of the house when it was an inn in the olden days. Saffron Walden may be congratulated on its museum, which is arranged and cared for in the best manner possible. The curator, Mr. Maynard, conducted the visitors over the building, and pointed out the chief objects of archæological interest. But it is not archæology only that is represented here; the natural history collection is exceptionally rich in good and rare specimens, and the geological department is well worthy of a visit. We wish that other towns in England were as well provided with such excellent schools of instruction. In this respect we fear England is behind France, where almost every town of any importance has a museum. The church is a fine specimen of Perpendicular architecture, but has been too much restored to suit the taste of the antiquary. Some of the more energetic members also paid a visit to the Castle and the Maze, on which a paper prepared by the veteran antiquary, Mr. Joseph Clark, was read by Mr. Charlsworth.

In the evening Mr. W. H. St. John Hope read a paper on "The Armorial Ensigns of the University and Colleges of Cambridge," and the Rev. Dr. J. C. Cox read a paper on "Field Names and their Value, with a Proposal for their Systematic Registration."

Saturday, Aug. 13, was devoted to King's Lynn and Castle Rising. The members arrived at the former place about eleven o'clock, and were received at the railway station by Mr. E. M. Beloe, who conducted them to "Our Lady's Chapel on the Mount," a charming piece of architectural work, founded in 1483, for no other purpose than to receive offerings. The party next visited the central tower of the Grey Friars, the only portion of the building now remaining. It stands out well, and forms a striking feature in the town. Mr. Beloe reminded his visitors that in early times the trade of Lynn was very considerable, and one of the consequent results was the erection of its splendid buildings, notably the Churches of St. Margaret, founded 1100, and St. Nicholas, founded 1200. In the Town-hall were inspected the Corporation plate. The celebrated Lynn Cup was carefully examined by some of the experts. It is known as King John's Cup, but it certainly does not date further back than 1370. Mr. Beloe drew special attention to a book called the "Red Register," which he claimed to be the second oldest paper book in existence. It contains a register of early wills and notes of interesting events connected with the Corporation. The records of Lynn are intact from the year 1440 down to the present time. The charters, some of which were exhibited, date from the reign of King John. Some excellent rubbings of the Walsoken and Braunche Brasses were exhibited and explained by Mr. E. M. Beloe, jun. After leaving the Town-hall, the party made a halt at the Custom-house, to allow of a short inspection of this interesting and picturesque building. At two p.m. the archæologists started for Castle Rising, a pleasant drive of about five miles. The earthworks surrounding the Norman building are of considerable dimensions, and are probably Saxon in origin. Inside this inclosure may be seen the site of the ancient Saxon church. When the Normans arrived here, they built a church at the bottom of the hill, and the Saxon structure fell into disuse. Mr. W. H. St. John Hope fully described the castle and earthworks, and conducted the members over the buildings. An inspection was subsequently made of the Norman church of Castle Rising, after which the party returned to King's Lynn, where they were entertained at tea by Mr. and Mrs. Beloe, and in the evening returned by train to Cambridge.

The proceedings on Sunday were of the ordinary character, the official service being in the Church of St. Mary-the-Great, where a sermon was preached by the Rev. J. C. Cox, LL.D. In the afternoon, many of the members attended the service at King's College Chapel.

The members of the Institute who joined in the excursion on Monday last, the 15th, to see the Marshland churches, were indeed fortunate. The weather was all that could be desired to make a drive of some twenty miles from Wisbech to Lynn agreeable and pleasant. The scenery, though not romantic, is picturesque, and is rendered the more so by the many windmills dotted all over the landscape. In some cases these mills have six sails instead of the usual number. The churches visited are of the highest importance to the antiquary. One of the oldest members of the Institute, who has been a constant attendant at the annual meetings, said he never remembered visiting such a fine series of buildings.

Walsoken was the first halting place. The nave of its church is Norman; the aisles are of the same period, or probably a little later. Mr. Micklethwaite called attention to the existence of a "high side window" in the south-west corner of the nave. It is a small quatrefoil now blocked up. He said there was considerable divergence of opinion as to the use of these windows, but he considered they were merely intended to give light. The font was much admired, and was worthy of a more minute inspection than time allowed. Unfortunately, the party was obliged to hurry onward to make up time, as the train which brought them to Wisbech was nearly three-quarters of an hour late, and thus the arrangements for the day were somewhat upset. West Walton was the second of the series of churches on the agenda. The main part of the building is Early English. The aisles have at some period been widened to give greater accommodation, but this alteration

has not improved the appearance of the building. The old north door, however, has been preserved and re-erected in the wall of the widened aisle. On the south side of the nave is a very beautiful Early-English window, well worthy of special attention. No visitor will ever forget the splendid and massive tower, detached from the church, which acts as a gateway to the churchyard. Formerly there existed a strange peculiarity in this parish. Up to quite recent times there were always two rectors to the church.

After lunch at the schoolroom at Walpole St. Peter's, the church close by was inspected by the members of the Institute. It is of later date than the two previously visited, being a magnificent specimen of fourteenth-century work. One striking feature is the height of the communion table above the floor of the chancel. This is in consequence of a passage having been constructed under the east end of the church. The rood-screen, before it was destroyed, was unusually high, so as not to obstruct the view of the high altar. In the north porch is a stone boss with a representation of "Our Lady of Pity." Walpole St. Andrew's Church was next visited. Mr. Micklethwaite said that, though a much smaller church than the last, it was yet quite as interesting, chiefly on account of its fittings. There is a stone bracket on the south side of the chancel arch, on which originally was placed the pulpit. Mr. Micklethwaite said that there was no rule as to the proper place for the pulpit. it might be placed on either side of the chancel arch. Terrington St. Clements was the last of the Marshland churches visited by the members. It is, perhaps, the most beautiful of the series. The chancel is Early English, with Perpendicular windows. The nave arcade is Decorated, the transepts and crossing of the same period, but a little later, and the aisles belong to the Perpendicular era. After a thorough examination of this church, the party drove on to Kings Lynn, and returned thence by train to Cambridge.

The last excursion of the Institute was made on Tuesday, the 16th, to Ely. The Cathedral was inspected under the direction of Mr. W. H. St. John Hope. He commenced his lecture on the history of the building in the south transept, where a large plan was hung up showing what the cathedral originally was, then, by means of coloured plans superimposed, Mr. Hope was able to explain the gradual development that had taken place to the present time. The beautiful though dilapidated sculptures of the Lady Chapel were described by Mr. M. R. James. The subjects represent scenes from the life of and the miracles performed by the Blessed Virgin. In the afternoon the conventual buildings were visited, under the guidance of Mr. Hope and Archdeacon Chapman. Some of the members paid a visit to Mr. Fisher's museum, which contains a most interesting and valuable collection of prehistoric and Roman antiquities, chiefly found in the Fen country.

The concluding meeting was held in the evening in the Guildhall, where, under the presidency of Chancellor Ferguson, the usual votes of thanks were passed to the local authorities for the welcome afforded to the Institute during its stay in Cambridge.

We must not conclude this notice of the Institute's meeting without referring to Mr. N. C. Hardcastle, LL.D., who devoted all his spare time towards making the meeting a success. His courtesy, kindness, and energy will ever be impressed on all who had the honour of making his acquaintance, and the members' thanks are chiefly due to him for the admirable manner in which the excursions were conducted.

THE ENGLISH IRON TRADE. — Quietness is still the prevailing characteristic of the English iron market, and that this unhappy state of affairs has not only been prevalent in recent months but has been general during the first half of the year is shown by the pig-iron statistics issued by the British Iron Trade Association. From these we learn that the production of pig-iron in the first six months of 1892 was 2,790,918 tons compared with 3,812,787 tons in the corresponding period of 1891, a decline of 921,469 tons. The consumption of crude-iron in the same epoch was 3,050,354 tons against 3,532,554 tons, or a diminution of 480,200 tons. The manufactured-iron trade is very dull; but tinplates are in somewhat better demand. The steel trade generally is not very brisk. Shipbuilders and engineers continue only moderately engaged. The coal trade is somewhat quiet.—*Iron.*

THE ARCHITECTURAL ASSOCIATION:

TWENTY-THIRD ANNUAL EXCURSION.

THE headquarters of the Architectural Association for the present, their twenty-third, annual excursion, are at Taunton, a town more remarkable for its historical associations than for its existing architectural beauties, but nevertheless a good centre for visiting much of Somersetshire. Although this is the fourth excursion of the Architectural Association to Somerset, they do not appear, from their programme, to have yet exhausted the architectural interest of that county in their previous visits to Wells, Bath, and Yeovil.

As usual, the Sunday previous to the official commencement of the week's work gave an occasion of meeting to old friends, and a revival of the reminiscences of former happy times. Sunday not being part of the programme, members followed their own bent, and stayed quietly in Taunton, made short walking trips in the neighbourhood, or otherwise occupied themselves, according to their individual bent. On the next day commenced the serious work of the week.

Monday.

The first day, fortunately, despite some showers on the previous evening, opened fine, and an excursion was made to various parishes close to Taunton.

The first halt was made at Bishop's Hull, where the Manor House, dated, as was seen from an inscription on the porch, 1586, was first inspected. The front, though without much elaborate detail, is a pleasing example of quiet and refined design, with projecting wings at each end of the façade, and a porch of slighter projection in the centre. The house was probably built by Sir George Farewell, who died in 1609, as is recorded on his tomb in the church. Internally there is little of special interest; one room on the upper floor possesses some good panelling, with a rather pleasing frieze of shields and conventional foliage between in flat carving. The house also retains a tradition of having been for a time the hiding-place of Monmouth after his disastrous insurrection, and the memory of Judge Jeffreys is also connected with some of the rooms. An example of the necessity some of the former owners were under of concealing, as far as possible, incriminating evidence may be noted in the form of a broken alabaster crucifix, which was found in the interior of a beam, and which, from the traces of rich colour and gilding still remaining, seems to have been of particular importance. The church has an octagonal tower of pleasing proportion, placed in a somewhat unusual position on the north side of the church; but as the building was probably altered about the same date as the erection of the manor house, or at any rate early in the same century, and was certainly enlarged in 1826, the precise arrangement of the original plan is doubtful. There are some fine examples of the carved bench-ends so frequent in this part of Somerset, and the monument to Sir George Farewell, already mentioned, besides others to members of the same family.

Trull Church was next visited; it is remarkable for the rich character of its carving in bench-ends, screens, and pulpit, and for the exceptionally perfect stained glass in the chancel windows. Of these latter the east window has paintings of the Crucifixion, with the Virgin and St. John on either side; while the south window, which is, if anything, superior in design and colouring, shows figures of St. Michael, St. Margaret, and St. George. The date of the carving, and probably of the church, may be learnt from an inscription on one of the bench-ends: "Simon Warman, maker of this worke, A° Dni 1560. John Waye, Clarke here." Warman's work shows that he must have been a man of remarkable fertility of invention and boldness in craftsmanship, not quite equalled by technical skill, as the carving, though extremely vigorous, is deficient in delicacy and finish. The pulpit is a very fine example, with boldly-carved figures of St. John and the four great Doctors of the Roman Church. The church possesses north and south aisles to both chancel and nave, and a western tower with six bells.

Poundisford Hall, the next stopping-place, has lost much of its interest from the addition of stucco externally and of modern improvements internally. The hall has a good plaster ceiling, with ribs in geometrical arrangement, and somewhat heavy pendants. There are in many of the rooms richly-modelled plaster friezes, but these have entirely lost their sharpness and much of their detail from repeated applications of whitewash laid on without due regard to the preliminary washing-out of former coats. A very fine rain-water butt of cast lead, with ornamental panels, showing mermaids combing their tresses, conventional foliage, and bearing date 1671, stands in front of the house. The frieze of this water-butt is interesting, representing scenes in an apple orchard, which suggests that it may have been used for cider making, though the position in which it now stands seems to be the original one, and so negatives the suggestion. There are several summer-houses in the grounds which are remarkably picturesque.

Two churches were next visited, the first being Ruishton, which has a fine tower, though somewhat low in proportions, of a type not uncommon in the vicinity of Taunton. This has coupled windows in the belfry stage, most of which are filled with pierced tracery, and in the stage below a single blank window of similar form to those above. At the eastern end of the north side of the tower, which, by the way, is at the west end of the church, is a semi-octagonal turret,—a not uncommon feature in this locality. Another feature also often found in these churches is the pinnacle set diagonally on the upper part of a rectangular buttress. Internally there is not much of interest. The church consists merely of a nave and chancel, with a chantry chapel on the south side of the nave, having a double hagioscope to the chancel. There is also evidence of the former stair to the rood-loft, though all other trace of the screen is lost. An Early Decorated window, inserted at the east end of the chantry mentioned, seems to show that an earlier church preceded the present Late Perpendicular structure. Over the altar is an old painting, evidently Flemish, representing the Adoration of the Magi, and some Flemish traceried panelling is further used as a reredos to the east end.

Creech St. Michael, the last church visited on the first day, is a comparatively large church, rebuilt apparently in the sixteenth century, as the lower part of the tower and one bay of the arcade eastward, as well as the disused south doorway, are clearly of thirteenth century date. Many of the arches internally have canopied niches for figures, and over the west window, there exist, in a well-designed niche, the remains of sculpture representing The Father supporting the Crucified One, and therefore forming part in all probability of a not uncommon representation of The Trinity in late pre-Reformation times. A number of well-carved bench-ends of good design have in quite recent times been adapted for the choir seats and other church furniture.

Tuesday.

On the second day the district visited was at some little distance from Taunton, and train was therefore taken to Minehead station, from which carriages conveyed the members to the church of Minehead, and thence to Dunster, Cleeve Abbey, and St. Decuman's Church, near Watchet, from which station the rail was again taken back to the head-quarters at Taunton. The morning was unfortunately wet, a meteorological phenomenon usually expected on the Association excursion, but the latter part of the day was as fine as anyone could wish.

Minehead has some points in its history which are interesting. At the time of the Conquest it was called Manheved, and was bestowed by William upon his follower, William de Mohun, but does not appear to have been in a fortunate position, exposed as it was to the predatory incursions of the Danes on the one side, and dominated by the powerful stronghold on the other. In 1642, it is true, it formed the base of operations by the cavaliers in their attacks on Dunster Castle. "Amongst the curiosities of Minehead is the Cow Charity." By an Act of Parliament passed in the 18th of Charles II., it was enacted that the importation of cattle into Minehead should be considered a nuisance after February 1, 1666, and that they should be forfeited, half the value to be applied to the use of the poor and the other half to be given to the captors. A certain capture having been made, the moiety was laid out in the purchase of an estate, the rental of which, amounting to about 30*l.* per annum, together with the interest of 1,197*l.* 5s. 7d. Three per Cent. Consols, arising from unappropriated accumu-

lation of income, is distributed annually among the poor in money and clothing. This charity is called the "Cow Charity." A species of fish is found at low water on the locks off Minehead, which affords a peculiar fluid, having the property of communicating to linen a purple tint, supposed to be similar to the *murex* which produced the Tyrian purple mentioned by Pliny.

The celebrated lawyer Henry de Bracton is said to have been born at Bratton Court, an old mansion here. Over the principal gateway which remains is a room called the Judge's Chamber, traditionally reported to have been his study, but the building is of a later period than the age in which he lived. Dr. Brocklesby, the friend of Johnson and Burke, distinguished as a physician and medical writer, was likewise a native of Minehead.

The church possesses one of the finest screens in Somerset, the carving being particularly delicate in execution as well as vigorous and resourceful in design. The stairs to the rood-loft still exist in perfect preservation on the south side of the church, and the turret in which they are enclosed forms a picturesque feature on the exterior. A good canopied monument on the north side of the chancel is said to be that of Bracton, the famous lawyer already alluded to, but is evidently of much later date, and the tomb of a priest, from the chalice which he holds and the vestments he wears. The font is octagonal, and richly decorated with figures of apostles and saints.

From Minehead a drive through beautiful scenery takes one to Dunster. Although remains have been found which prove Roman occupation, the town, which is called Torre in the Doomsday Book, owes its origin to a baronial castle built here by William de Mohun, a Norman baron, on whom William the Conqueror bestowed large estates in this part of the kingdom. He also founded a priory of Benedictine monks as a dependency to the abbey at Bath, the revenue of which at the Dissolution was 37*l.* 4s. 9½d. In the deed of gift conveying the property to the Abbey of St. Peter's at Bath the name Dunestora is used. The castle, which was held by the family of Mohun till the reign of Edward III., was the scene of hostilities during the civil wars which took place in the reigns of Stephen and John, and in the contests between the houses of York and Lancaster; and the Marquis of Hertford took possession of it for Charles I. during the war with the Parliament. The castle has been the residence of the family of Luttrell since the time of Edward III.

The castle still remains in the possession of the Luttrells, and though the interior has been much modernised, and additions made under the direction of Salvin about the year 1867, it still retains much of its interest and character. As might be expected from an ancestral home of so old a family, many examples of old furniture and decoration are to be seen in the interior. One of the most interesting of these is the series of splendidly-executed paintings on leather, representing principally scenes in the story of Antony and Cleopatra. These serve as wall-hangings in lieu of tapestry, and from the costumes are evidently of the date of Charles II.'s reign, and are said to be of Italian workmanship. Very few examples of this class of work exist even in Italy, at least of so much importance and completeness. The staircase is adorned with an elaborately-carved balustrade of the date 1681, when various improvements were carried out by the then owner, Francis Luttrell.

In the small town of Dunster, which lies at the foot of the hill on which stands the castle, there are some picturesque buildings, amongst which the Yarn Market, an ancient picturesque structure of wood, from its position is, perhaps, the most striking. (We give a view of this on a preceding page.) It was built about A.D. 1600, when the Dunster manufacture of woollen "kerseymeres" was of importance, and was repaired in 1647. The "Luttrell Arms" Hotel has several parts remaining of sixteenth-century date, with some ornamental work in the form of chimney-pieces and ceilings of the succeeding century.

A picturesque building called "The Nunnery," reminds one of Normandy and Brittany, with its overhanging stories sheathed in slate, which seems to have been superimposed on half-timber work.

The church, probably erected about 1419 A.D., is said to have been built by Henry VII. in acknowledgment of the assistance afforded him by the men of Dunster in the Battle of Bosworth Field. It consists of a nave, aisles, and chancel, with a central tower ornamented with embattlements and pinnacles, beyond which to the east is a kind of Lady Chapel, formerly the monastic church of the priory, This part of the building was also used by the incumbent of the parish for the performance of divine service until the year 1499, when a dispute arising between the monks and the parishioners the matter was referred to the Abbot of Glastonbury, who decided that the latter should have a choir separate from that of the monastery.

The church contains many fine sepulchral monuments belonging to the families of Mohun and Luttrell, and has been pretty thoroughly restored under Street. The screens are similar in character and excellence to those at Minehead, and show evidence of having been designed and executed by the same hand. Some few remains of the monastic buildings, besides the rather apocryphal "Nunnery" already alluded to, may be seen in the neighbourhood of the church, the great barn being the most noticeable.

From Dunster the members of the party proceeded to Cleeve, a perfect paradise for water-colour sketchers.

Cleeve Abbey was an offshoot from the Cistercian Abbey of Revesby, in Lincolnshire, and seems to have been established by the joint founder of both monasteries, William de Romara, in 1188. Thus we have here an example of the Cistercian practice of establishing distinct abbeys as offshoots from older institutions, instead of the more dependent priories favoured by other monastic orders. Some of the remaining buildings undoubtedly formed part of the original church and monastery founded by William de Romara. The dormitory is one of the most perfect examples of monastic times, and dates amongst the earliest parts of the Abbey, although it has been altered probably in the time of the last Abbot, William Dovell, in the fifteenth century, as he seems to have made considerable alterations, building a new refectory, in the unusual arrangement for Cistercian monasteries, parallel to the cloister, instead of at right angles to it, as was the situation of the older refectory here.

The roof is an excellent example of early hammer-beam type, in very good preservation. At the east end may be distinguished the remains of fresco painting as well as in the abbot's lodging.

The other parts of the abbey in the best preservation are naturally also part of Dovell's work, including the south wall of the cloister and the gatehouse to the Abbey precincts. Of the church nothing remains but the foundations, from which, however, the plan can be made out, and the basis of some of the circular piers as well as the fragments of floor-wing show it to have been of Transitional date.

From Cleeve Abbey the excursionists drove on to St. Decuman's, so-called from its patron saint Decombes or Decumanus, who, landing from South Wales and finding a perfect wilderness, fixed upon this spot, in order to seclude himself from the rest of the world. Having been murdered, he was canonised in due course. The church, with the exception of the east window, is of Late Perpendicular work, with a lofty tower at the west end. Several of the nave piers still retain their canopied figures of St. Decuman, St. George, and other saints. The figure of St. Decuman may also be seen on the external south face of the tower. There is some good carved woodwork in the screens, though these are not equal to those at Minehead and Dunster, but the roofs have exceptionally good cornices and winged figures of the various orders of angels. There are some excellent brasses to the memory of the Wyndham family, one with raised figures,—a style of work not usual in England, though frequently found in Germany. The pulpit with its canopy are fair examples of Jacobean work, and the altar rail also dates from the same period.

At St. Decuman's concluded the second day's work of the party.

We will continue our account of the excursion next week, with additional illustrations.

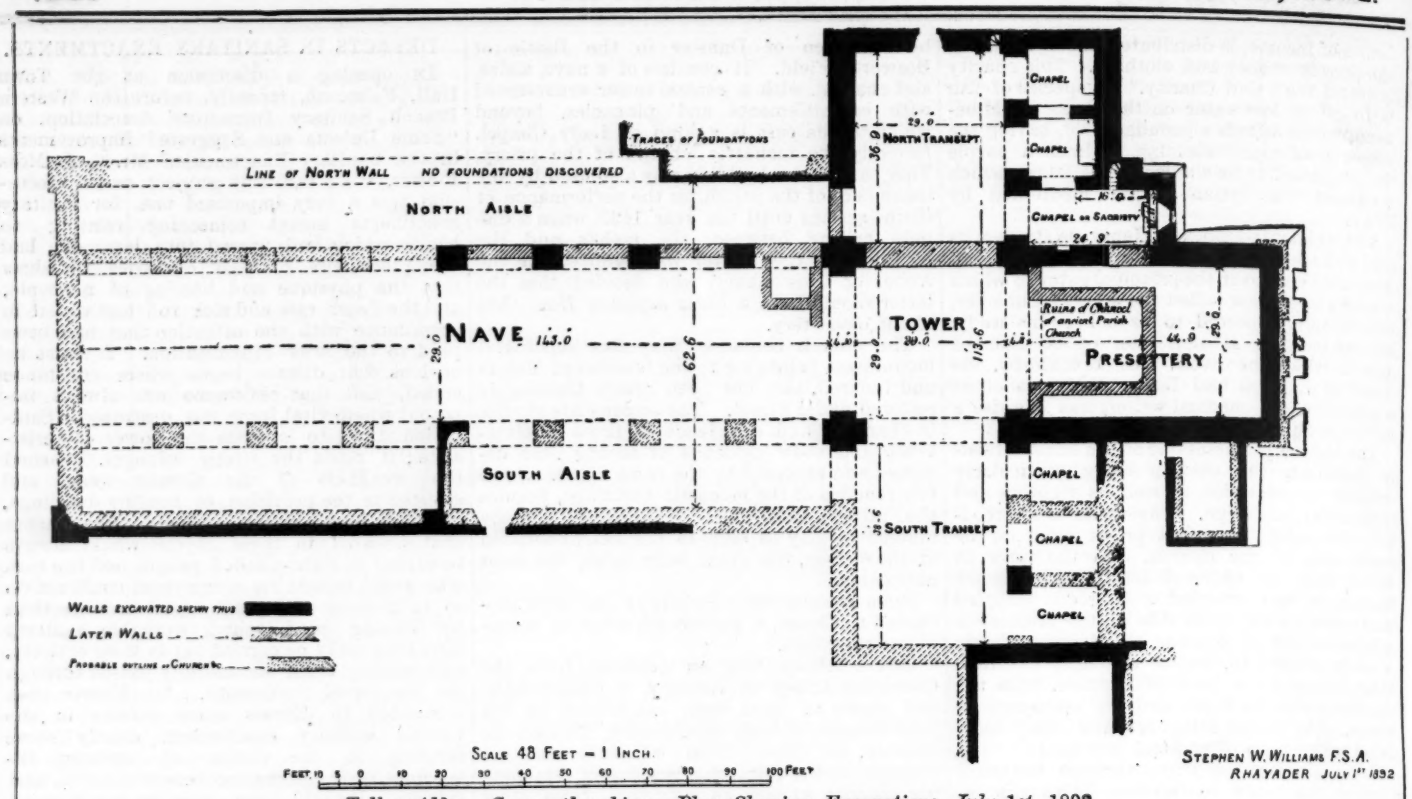
Board Schools, Llanelly.—We understand that the Llanelly School Board have instructed their architect, Mr. J. B. Morgan, to prepare plans of a school for the Dock district, to accommodate 300 children; also for a school for Machynis for 200 children.

DEFECTS IN SANITARY ENACTMENTS.

In opening a discussion at the Town Hall, Falmouth, recently, before the Western Branch Sanitary Inspectors' Association, on "Some Defects and Suggested Improvements in the Sanitary Enactments," Mr. T. J. Moss Flower, C.E., said the subject under discussion was a very important one, for sanitary enactments meant something relating to health which had passed into law. We had the precedents of past centuries to show that the physique and bearing of a people, and the death rate and sick roll had varied in accordance with the attention that had been paid to the laws of sanitation. It must be obvious that disease began where resistance ended, and that resistance was always impotent where vital force was destroyed. Sanitation aimed to increase the power of resistance; it made the strong stronger, lessened the weakness of the already weak, and assisted in the provision of healthy dwellings, good drainage, water, and air. Enactments that assisted in these objects would always be valued by right-minded people, and the man who would benefit his countrymen could not do so in a more noble and useful manner than by framing good, sound, workable sanitary laws that could be carried out in their entirety, and getting them successfully passed through the Houses of Parliament. Mr. Flower then proceeded to discuss some defects in the various sanitary enactments, chiefly those relating to the duties of sanitary inspectors, their designation, tenure of office, and salaries. He said there were so many small enactments as to cause much confusion, and that this should be remedied by the passing of one Act dealing with the Public Health expressed in plain, simple language with very many of the permissive clauses removed. *Shall* should be substituted for *may*, so often used, as for example in matters specified in section 157 of the Public Health Act, 1875. Where urban authorities "may" make bye-laws, it should read urban authorities "shall" make bye-laws, and other sanitary authorities too, because it was of great importance to all that the detailed sanitary arrangements in towns and villages should be as perfect as possible, and that could only be arrived at by local authorities exacting a due compliance with a satisfactory set of by-laws. He thought it very desirable that a uniform set of by-laws should be drawn up by the central authority in respect to those matters referred to in Section 157 of the Public Health Act, 1875, and it should be enacted that every local authority "shall" adopt such by-laws with such modifications as the central authority may deem fit, after receiving the evidence in favour of the required modification. In the drawing-up of these by-laws he would invite local surveyors and others continually dealing with these matters to express an opinion in writing to the central authority, stating what they thought was required, and he ventured to think that a set of by-laws might be arranged to meet all circumstances without being arbitrary. The speaker then touched on several defects in existing legislation, and concluded by saying that, in his opinion, sanitary officials should be responsible to a central authority, who only should have the power to remove them on just cause being shown. Although he had only mentioned upon a few defects, many more led up from them. He urged upon members of County Councils, Sanitary Authorities, Sanitary Officials, and, in fact, all who had an interest in the public health—and surely all must have, if they had the welfare of their country at heart,—to earnestly push forward and agitate for the appointment of a Minister of Health to guide and direct sanitation in all its departments.

Messrs. Reed, Blight, & Co. (Limited), contractors, Plymouth, have opened offices at Albany-buildings, 47, Victoria street, Westminster, S.W.

New Dry Dock at Jarrow.—The Mercantile Dry Dock Company, Jarrow, opened at Jarrow, on the 4th inst., a new dock, to be known as "No. 2 Dry Dock." The new dock is situated on the high side of the old dock, about four hundred yards or more below Palmer's works. The contract for the making of the dock was let to Mr. J. Best, of Edinburgh, and the engineer of the works is Mr. James Watts Sandeman, of Newcastle. The following are the principal dimensions of the dock:—Clear length on floor, 350 ft.; width at top, 72 ft.; width on floor level, 49 ft.; width of entrance, 50 ft.; depth of entrance below cope level, 24 ft. 9 in.; depth of water on cill, 21 ft.



Talley Abbey, Carmarthenshire. Plan Showing Excavations, July 1st, 1892.

Illustrations.

ARCHITECTURAL ASSOCIATION EXCURSION: PLACES VISITED.

THE illustrations of Somersetshire given in the present issue include some of the principal buildings in Taunton and its neighbourhood visited by the Architectural Association during their annual excursion. They should be taken in connexion with our leading article and the report of the proceedings which will be found in this number. We shall continue our report next week, together with some further illustrations of places of interest.

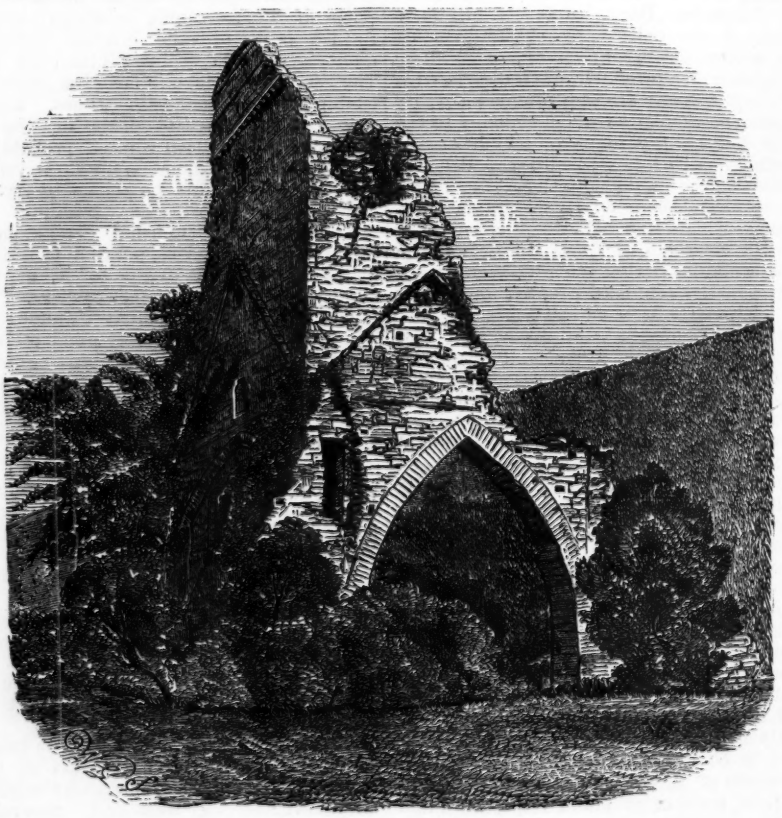
The photographs of the churches of St. Mary's, Taunton, St. James's, Taunton, and Kingston St. Mary, are by Mr. H. M. Cooper, of Taunton; those of Bishops Lydeard and Creech St. Michael and Ruishton by Mr. Frith.

THE CAMBRIAN ARCHÆOLOGICAL ASSOCIATION AT LLANDEILO.

BEFORE continuing our report* of the proceedings of this Conference, we may refer the reader to last week's *Builder* for the account of the excavations at Talley Abbey, of which we are now able to give a plan, as well as a small view of the remains as they appear. For the loan of these and other illustrations to this report (which are all taken from the *Archæologia Cambrensis*) we are indebted to the Committee of the Cambrian Archæological Association.

On Wednesday, the 10th inst., the proceedings commenced with an examination of Llandeilo Parish Church, the ground-plan of which, consisting of a nave and chancel, with nave aisles and chancel aisles on the south, but none on the north, and a western tower, is typical of nearly all the others in this district. Restorers (in this particular case the late Sir Gilbert Scott) have succeeded in removing almost every trace of interest the buildings may have once possessed. The character of the towers has not been materially altered, but the substitution of modern tracery in all the windows must always be a matter of regret to lovers of ancient ecclesiastical architecture. An inscribed stone formerly existed at Llandeilo which may have been of the time of St. Teilo, the patron Saint. Unfortunately, it appears to have been completely lost. The only record of its existence is in a note made by the well-known antiquary, Edward Lhwyd, in 1697. There are, however, preserved within the church two heads of wheel crosses (one of which is elaborately ornamented with interlaced work) of the ninth or tenth century.

* See last week's *Builder*, p. 125.



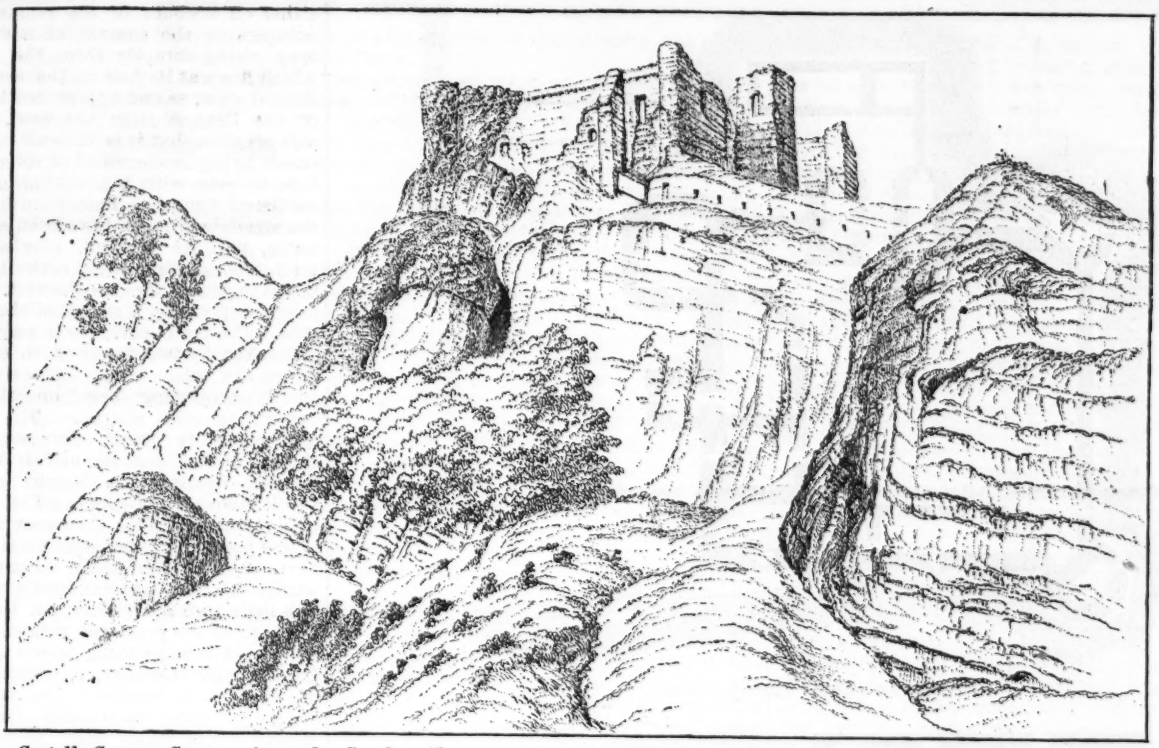
Remains of Talley Abbey.

At ten o'clock the carriages were ready to convey the party to Dynevor, visiting on the way the little church of Llandefeisant, close to Llandeilo, which possesses hardly any points of interest to detain the archæologist. Mr. Penrose, the great authority on the optical refinements of Greek architecture, formed one of the party, and his trained eye was at once struck by the extraordinary jumble of mouldings of the thirteenth and fifteenth centuries which the restored western doorway exhibits.

A short drive brought the members to the modern mansion of Dynevor, a building erected in execrable taste, and forming a marked contrast to the exquisite demesne in which it is situated. The ancient castle of Dynevor occupies a strong position on the north bank of the river Towy, nearly a mile south of the house. The park surrounding it is well wooded, and its forest glades may fairly be compared with those of Windsor. The view of the castle across the green lawns, that have taken centuries to mature, is as fine as anything in the whole of Wales. The principal feature in the ruins is a drum tower of large dimensions, not unlike the one at Pembroke, but somewhat smaller. The over-sailing corbel course, although a simple form of decoration, is used with as good an effect here as in the towers of the churches. Neither the history nor the architecture of Dynevor Castle has been investigated by any competent person, although it was in mediæval times one of the most important fortresses in the Principality. The most ancient part of the present structure does not date back beyond the thirteenth century.

Proceeding two miles further westward along the north bank of the Towy, the church of Llangathen was reached. It has a good tower, and contains a fine monument in the Renaissance style to Antony Rudd, Bishop of St. David's (who died in 1614), erected by his wife, Anna Dalton, two years after his decease.

The next place on the programme was Cwrt Henry, where, if tradition is to be believed,



Castell Carreg Cennen, from the South. From a drawing by H. Longueville Jones. Engraved by J. H. Le Keux.

Cross-head, Llandeilo (Front).

Henry Earl of Richmond, afterwards Henry VII., slept on his way from Pembrokeshire to Bosworth in 1485. The house has been modernised, but contains a chapel and details of the fourteenth century.

The carriages now turned southward towards Dryslwyn (pronounced Druslin), where the river Towy is fordable and crossed by a footbridge. Castell Dryslwyn, a mere shell with pointed windows, occupies a prominent position on an isolated hill rising at a steep angle from the river. Resuming again a westerly direction for a mile and a half, the party arrived at Llanarthney, where luncheon was provided. The church here was described by the Rev. Canon Harris. The chief object of interest is a fine wheel cross of the ninth century, ornamented with very rudely-executed patterns. It bears an inscription in minuscules, which reads:—

merclea . . . cema
elma(t) (f)ecit crucem

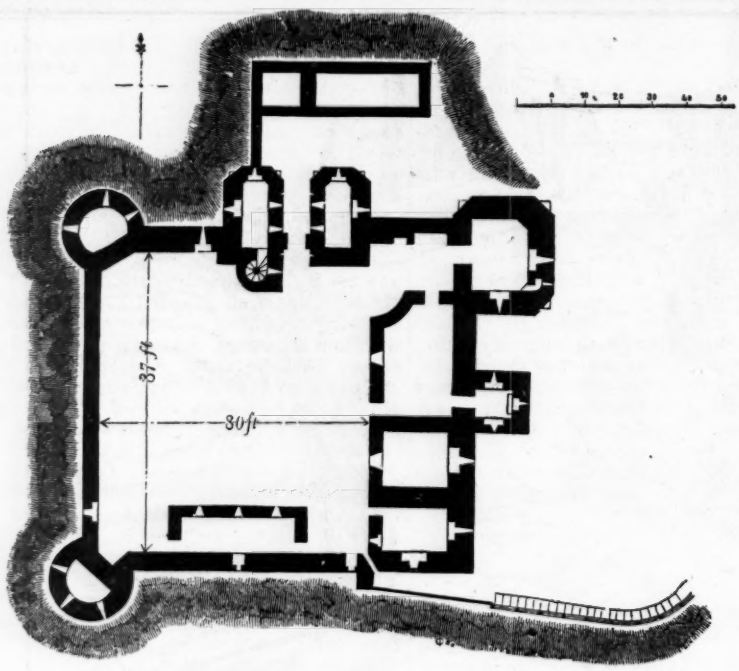
It is difficult to make anything intelligible out of the first line, but the second clearly shows that the cross was erected by Elmat. The name Elnat occurs on a cross at Tintagel, in Cornwall.

Leaving Llanarthney, a drive of two miles brought the party to Middleton Hall. This mansion takes its name from David Middleton, brother to Sir Hugh Middleton, or Myddelton, the Welshman, to whose enterprise London is indebted for its New River Water Supply, an original share in which undertaking is now worth a king's ransom. Mrs. Abraham, the present owner, received the members, and exhibited a number of antiquities collected from the neighbourhood, including a bi-lingual ogam inscribed stone found at Llanwinio in 1846, the matrix of a thirteenth century seal with the Virgin and Child upon it, and several bronze celts and spear-heads.

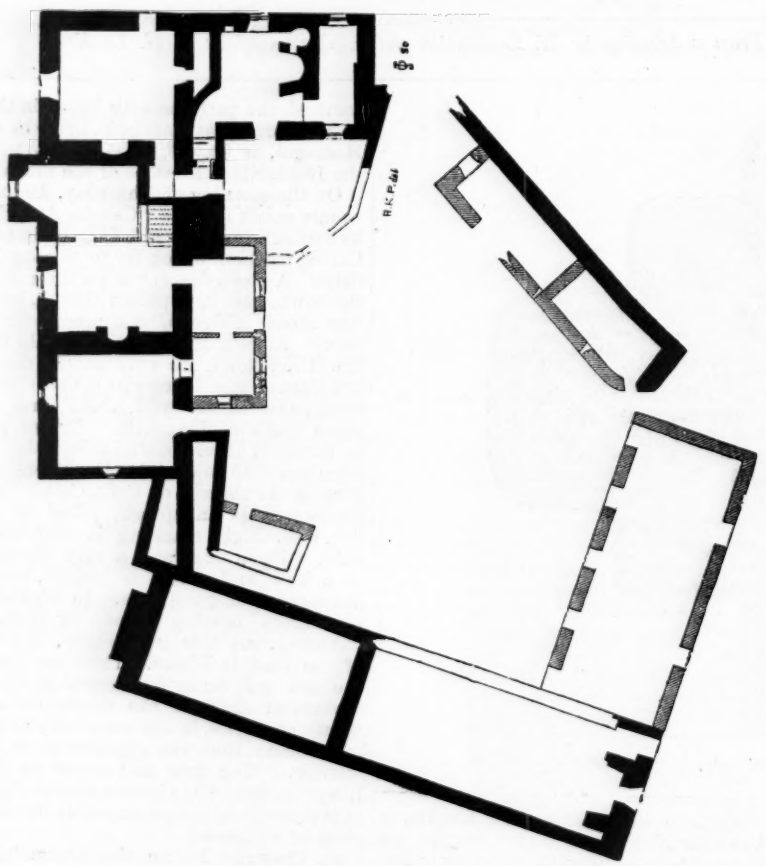
On the return journey to Llandeilo, a distance of eight miles, a short stay was made at Golden Grove, the residence of Lord Emlyn. The house is comparatively modern. The chief historical associations connected with the place relate to Jeremy Taylor, who found a refuge here when his living was sequestrated during the Parliamentary war in the time of Charles I. In the American Garden at Golden Grove is an elaborately ornamented cross-shaft of the ninth century, brought from Glansannan Farm, two and a half miles N.E. of Llanarthney. It bears the name Eiudon in minuscules, and was locally known as the "Llech Eidon," or Eidon's Stone. Mr. Romilly Allen read a paper on this remarkable monument, in which he showed that the ornament was identical with that on the crosses at Llantwit Major, in Glamorganshire, and at Carew and at Nevern, in Pembrokeshire. He also remarked upon the similarity of some of the patterns with those in the Gospels of Macdurnan, at Lambeth, and the Gospels of Macregol, at Oxford, and thereby proved that the Llech Eidon must be of the ninth century.

On the morning of Thursday, August 11, the excursionists left the "Cawdor Arms" at 9 a.m. by carriage for Derwydd, Llandybie, and Castell Carreg Cennen, which lie to the south of Llandeilo. A steep descent down the main street of the town, past the parish church, leads to the fine stone bridge of one span over the river Towy. After crossing the strath through which the Towy flows, the road enters the valley of the Cennen and follows its course along the east bank as far as Derwydd, about three and a half miles south of Llandeilo. Before proceeding to Derwydd House, a slight deviation was made from the road to examine the Maen-Llwyd (*i.e.*, grey or old stone), on Cefin Cethin farm. The monument is an upright pillar of limestone 8 ft. 6 in. high, standing in the middle of a field. Upon one face a very distinct outline of a bow and arrow is incised, having every appearance of great age. In Scotland, standing stones bearing incised symbols are not unknown, but this is, perhaps, the only thing of the kind in Wales. There are instances of the bow and arrow being used symbolically on sepulchral slabs of the thirteenth and fourteenth centuries, in the same way as the sword, to indicate that the grave-stone is that of a warrior. The bow and arrow on the Maen-Llwyd may possibly have a similar signification. It is difficult to assign any date to this curious piece of sculpture.

At Derwydd House the archæologists were received most courteously by the owner, Mr. Alan Stepney-Gulston, who led them through the various rooms, explaining as he went the points of interest in each. The house is an old one, dating back to the fifteenth century or earlier, modernised with excellent taste and wise discretion, so that nothing ancient has been tampered with. In addition to a fine collection of Oriental porcelain, and Hispano-Moresque faience, Mr. Gulston is the happy possessor of many historical relics of great value. Chief amongst these is the carved oak bedstead traditionally believed to be that of Sir Rhys ap Thomas, the illustrious Welshman to whose timely assistance Henry VII. partly owed his throne. The four posts of the bedstead are elaborately ornamented, and bear the arms of Sir Rhys ap Thomas. Round the three sides at the top is a beautifully executed frieze, about a foot deep,[1] upon which are represented a procession of figures consisting of warriors on horseback and on foot, monks, musicians playing the drum and harp, ladies, &c. As a study of mediæval costume nothing could be better. The artistic merit of the carving is considerable, and it would be very desirable to have it examined by a specialist with a view of determining whether



Plan of Castell Carreg Cennen.



Plan of Cwrt Bryn-y-Beirdd (from the South).

it is of foreign or native workmanship. In the entrance hall at Derwydd is preserved the celebrated "Hoda cum Tewdr" cabinet, of carved oak, and decorated with the coats-of-arms of families mentioned in the old Welsh pedigrees of George Owen (1591). Many other interesting objects were exhibited in glass cases, all admirably arranged and labelled, amongst which were the seal of Oliver Cromwell, and the badge of a local Jacobite Society, called the "Sea Sergeants." In the upper rooms of the house are some good plaster ceilings of the sixteenth century, and one or two carved stone mantel-pieces of the same period.

Resuming their carriages, the members placed themselves under the guidance of Mr. Gulston, who led the way to the Pant-y-Llyn bone caves, one mile south-west of Derwydd, and there delivered a short address in the open air on what was known of the discoveries made in these subterranean dwellings of pre-historic man. Only the site of the cave is now to be seen, as the whole of it has been removed in quarrying operations. Unfortunately the bones of extinct animals that were unearthed are now buried under many tons of debris in front of the quarry, and the human remains have all been lost with the exception of one skull which is preserved in the Oxford Museum. Mr. Gulston deserves great credit for having collected with so much assiduity the facts relating to this remarkable find.

From Pant-y-Llyn, a descent of about a mile brought the party to Llandybie Church, the examination of which was soon accomplished, as it contains nothing of sufficient interest to detain the archæologist. The carriages now returned along the high road to Llandeilo, and branching off at a point near Derwydd, where the river Cennen suddenly changes its course from a southerly to an easterly direction, soon reached Castell Carreg Cennen, A halt of a few minutes was made on the way, at Llwyn Beddau, to inspect a sepulchral cist, about 4 ft. square, formed of large stones set on edge, the sole survivor of seventy others stated to have existed on this spot.

Castell Carreg Cennen, although its ruins are not anything like so extensive as Kidwelly, or even Dynevor, is yet far more imposing than either on account of the romantic position it occupies on the summit of a steep limestone crag, rising abruptly from the River Cennen, which flows at its foot on the south side. The distant view, as one approaches it up the valley of the Cennen from the west, is so striking and peculiar that it is difficult to believe that one is living in the world of sober fact, and not face to race with the enchanter's castle of a mediæval romance, Before the days of artillery, the stronghold must have been almost impregnable, and its position, overlooking a wide stretch of country, would make it very useful as a watch-tower for the district. The plan is, roughly speaking, a square of about 100 ft. each side. The main entrance is on the north, and is flanked by two towers with octagonal ends. There are other towers at the angles, and a small projecting one on the east side, containing the chapel. The approach to the castle is from the north. On the the south the limestone cliff is almost perpendicular, rising to a height of more than 100 ft. above the Cennen. The ground on the two remaining sides (the east and the west) is less precipitous, but still so steep and rough as to form an admirable defence. There are hardly any architectural details now remaining. The little trefoil ornament on the springing of the arch of the principal gateway is worthy of notice. The same thing occurs at St. Quentin's Castle, near Cowbridge, which is no doubt of the same period. It is difficult to assign a date to Castell Carreg Cennen. Roman coins have been found within the enclosed area, and some wild enthusiasts did not hesitate to put down the masonry of the lower part of the walls,—which is different to the rest and better built,—as Roman. A more probable view is that it was constructed by the De Loudres, Lords of Kidwelly, as an outpost to the larger fortress, in the twelfth century, and was further strengthened in Edwardian times. The castle was given by Henry VII. to Sir Rhys ap Thomas, and eventually came into the hands of the Earls of Cawdor, through the Vaughans of Golden Grove.

One of the most interesting features of Castell Carreg Cennen is the remarkable covered way, which leads from a small opening in the south curtain wall down to what is supposed to be a well right in the heart of the limestone rock on which the fortress stands. The first portion of the passage is artificially constructed against the side of the cliff, and descends at a considerable angle in an easterly direction, the wall being loopholed at intervals to admit the light. The roof of the passage is of triangular section near the top, but like a penthouse-roof lower down. The bottom and inner sides of the passage are formed by the solid rock, the roof and outer side being artificial. At the bottom of the descent is a short flight of steps turning sharp round to the left and leading into a natural tunnel in the limestone extending for perhaps a hundred yards inwards from the face of the cliff. This tunnel terminates in a perpendicular shaft 6 ft. deep, now perfectly dry; near it is a very poor spring of dirty water, into which visitors, especially ladies, make a point of dropping in bent pins, not forgetting mentally to wish for some long-cherished object of desire.

The last place visited was Cwrt Bryn-y-Beirdd, an ancient Welsh mansion, now converted into a farm house, situated a mile south of Castell Carreg Cennen, on the opposite side of the valley. This portion of the excursion had to be accomplished on foot, as there is only a pathway leading to it in this direction, and the descent down one side of the valley and up the other is very trying, even to pedestrians. Cwrt Bryn-y-Beirdd, of which we give a plan, is pronounced by Professor Babington to be "one of the most interesting specimens in existence of a gentleman's house" of the time of Edward II. It contains many architectural details of the Decorated period, including an old fire-place with angle brackets at each side, in one of the upper rooms, and several cusped and pointed windows. Since the previous visit of the Cambrian Archæological Association to this spot in 1855, many ancient features have disappeared, which is much to be regretted.

The party returned thence direct to Llandeilo, well satisfied with the day's work.

In the evening, papers were read by Mr. J. Willis Bund, F.S.A., on "Teilo Churches," and by Mr. D. Lleufer Thomas on "Ancient Tenures."

The last day's excursion, the fourth of the series, on Friday, August 12, was to the great pre-historic fortress of Carn Goch, Llangadock, and Llandovery, all lying to the north-east of Llandeilo up the valley of the Towy. The weather, which had been unusually fine during the previous three days, still continued to be propitious. Leaving the Cawdor Arms at the usual early hour, the carriages were soon at the foot of Carn-Goch, four miles north-east of Llandeilo. After a pretty stiff climb on foot up the hill-side, the party assembled within the enclosure to hear Mr. Edward Laws, the learned author of "Little England Beyond Wales," deliver a most instructive lecture on the remains. The gist of Mr. Laws's remarks was that he believed Carn-Goch to be a fortified city of the Bronze Age, and he stated his reasons for coming to this conclusion in a very lucid manner. He described the typical stronghold of the Neolithic people who preceded the bronze-using race, observing that they relied more on nature than on art for their defences, and that such military works as they were obliged to construct consisted of small camps exposed to all the winds of heaven, and scarcely ever supplied with water. After considerable experience in exploring earthworks of the kind, he had formed the opinion that they were not dwelling-places, but refuges for a sparse population, who lived in the valleys below, and that, when danger appeared, the fighting men of the tribe hurried the women, children, and long-faced oxen, hairy little sheep, and great, long-legged pigs into these temporary places of refuge, where they made a stand until relieved by their neighbours. At Carn Goch, on the contrary, there was an excellent water supply, gigantic works, which proved the co-operation of a considerable population, and engineering of a very different order from that exhibited in the little cliff castles along the coast. The inhabitants of the fortress probably lived within the walls permanently with their flocks, herds, and other belongings. This view was borne out by a number of hut circles still visible inside the enclosure. Mr. Laws remarked that the fortification closely resembled certain camps in North Wales, and was exceeded in size by some of them, but Carn Goch was the largest in South Wales. One like it existed at Strumble Head, in Pembrokeshire, although inferior to it as regards size. Were he to dig within the walls of Carn Goch he would drain the pond which formed the water supply, and explore the interior of the oval enclosure, the great cairn, and the circular spaces in the walls. All this, however, should be done most carefully by skilled hands, for the man who destroyed relics of the past, simply to gratify a senseless curiosity, was guilty of a crime little short of sacrilege.

There are two camps at Carn Goch, the larger one being of approximately oval shape, 2,000 ft. long by 560 ft. wide; and the smaller one, which lies to the south-west, at a lower level, being an oval measuring 500 ft. by 350 ft. The walls are of dry rubble, with well-formed sally-ports, or roofed passages extending right through the rampart, at intervals. The *débris* of the walls is in some places 70 ft. wide and 16 ft. high. The situation of Carn Goch resembles that of the great prehistoric hill fort called the White Caterthun, near Brechin, in Forfarshire, in being on the borderland between the cultivated part of the country and the wild, barren tracts of heath-covered mountains behind it.

Leaving the breezy heights of Carn Goch, the party descended on the opposite side of the hill from the one they had come up, and, resuming their places in the carriages, were conveyed to Llangadock. Just before entering the town a short stop was made to examine Castell Meyrig, an earthwork of the same class as those which had been seen on Tuesday's excursion at Talley and Twrla, consisting of a moated mound and base-court. The village common, just beyond, with its clumps of furze bushes, presents a pleasing contrast to the highly-cultivated fields which surround it. Llangadock church is devoid of interest, and built on the same double-barrelled principle of ground-plan as the others in this district. After luncheon, two excellent collections of local antiquities were inspected at houses in the village, one belonging to Mr. Lewis Lloyd, and the other to Mrs. Thursby Pelham. Amongst the latter was a Roman intaglio ring, bearing a representation of Venus Victrix, holding the apple in her hand, which was found some years ago at Abermarlais, on the opposite side of the river Towy.

The party next went on to Llandovery by train. This place was really hardly worth the trouble of a visit. It has two churches, Llandingat, half a mile south of the town, and Llanfair-ar-y-Bryn, about the same distance to the north of it. Llandingat Churchyard contains the grave of Sir Gardner Wilkinson, the eminent Egyptian archæologist (born in 1797, and died in 1875). The church has more good architectural points about it than most of the others seen during the meeting. The tower is one of the best in the district; the chancel arch is Transitional Norman, though very plain; and the original Decorated and Perpendicular tracery in some of the windows is distinctly above the average. The restorer seems, for some inscrutable reason, to have played fewer pranks than usual with the building. Vicar Pritchard's house and Llanfair-ar-y-Bryn Church, where there are some curious gargoyles to the tower, were hurredly looked at, and the party then returned by train to Llandeilo.

In the evening a general meeting of the members was held at the Cawdor Arms,—Sir James Williams Drummond being in the chair,—at which votes of thanks were accorded to the local committee and the officials of the Association, whose labours contributed to making the Llandeilo meeting one of the most successful yet held. The names of Mr. J. Lewis Thomas (Local Secretary) and the Rev. Charles Chidlow (General Secretary) were specially mentioned.

It was announced that the next annual meeting would be held at Oswestry in 1893.

SEWAGE AND ITS PURIFICATION.

Dr. Charles A. Burghardt, Ph.D., &c., Lecturer and Examiner in the Victoria University, Manchester, Analytical and Consulting Chemist, read a paper on this subject at the recent annual meeting at Bury of the Incorporated Association of Municipal and County Engineers. Sewage, he said, is a very complex substance, chemically speaking, and can be divided into two distinct classes:—

1. *Domestic sewage*, which is mostly animal in its origin, and much charged with nitrogenous and carbonaceous matters which are more or less easily decomposed by so-called secondary decomposition, induced principally by the oxidising action of the oxygen of the air. The nitrogenous matters consist of urea, uric acid, colouring matters of animal origin, mucus, and various bodies in a state of unstable equilibrium, somewhat resembling albumen in their chemical characteristics, and called generally, for the want of a better term, "albuminoid matter."

2. *Manufacturers' sewage*, or the waste waters from all kinds of chemical works, dye works, bleach works, paper mills, &c. As a rule, this class of sewage is not rich in nitrogenous matters, but it is generally rich in carbonaceous matters, both in solution and suspension, and highly charged with various salts in solution. The substances in this class of sewage are more stable than those present in domestic sewage, consequently they are not so easily decomposed or oxidised, and their presence in a mixed sewage is, therefore, highly objectionable, because they actually prevent to a very great extent the oxidation and destruction of the domestic sewage, and act as a "resist" to the oxygen of the air.

From this generalisation of sewage I think it is clear that we Lancashire men have, unfortunately, the very best opportunities for thoroughly studying the question of its treatment, for we can certainly claim to turn out the most complex and abominable mixtures of sewage into our streams which it is possible to produce. Every possible variety of sewage is represented, and the investigator has all the material necessary for his enquiry at his own door. In a manufacturing district, therefore, the sewage of towns and townships consists of a mixture of the two above-mentioned classes of sewage, and it is constantly varying in composition, no two consecutive hours being alike. For this reason it is almost imperative that such sewage should be treated specially, with regard to the particular district from which it arises, it being scarcely possible to lay down one uniform method of treatment which will successfully meet all cases.

Some years ago I pointed out the immense importance of removing sewage of both classes from our streams, for this reason, viz.: if it were not removed, and pollution continued on the same scale, then it was quite certain that a time would come when our Lancashire streams would be so foul that no manufactures requiring clean water could be further carried on, and such manufactures and processes would be strangled by their own act, and the trade transferred to some other locality or country where such a disgraceful state of affairs did not exist. This was in 1884, and we now see in 1892 already signs that this opinion of mine was well founded. I shall deal with this subject of river pollution after I have dealt with that of sewage treatment, at the end of this paper. With regard to the treatment of sewage, it may be said that there are, broadly speaking, three general methods or systems adopted in this country, viz.:—

1. Irrigation and sewage farming.
2. Intermittent downward filtration.
3. Precipitation by chemicals, with or without subsequent intermittent downward filtration.

With regard to the first method, it has been known for a long time that, on the whole, it has proved to be a costly, and, I may also say, a ghastly failure. It is only in a very few highly-favoured districts where such a system can be successfully carried out, so fas as the purification of the raw sewage is concerned, and in all these cases there still remains the undeniable fact that from our present knowledge of the spread of disease by means of micro-organisms the covering of large areas of land with a deposit of sewage sludge or mud is a constant menace to the health of the people living in the neighbourhood of such areas. As the mud dries the micro-organisms (some of which may be highly septic) are spread by the wind far and wide, and find a congenial home in the bodies of the unfortunate population whose constitutions have been previously much impaired by the foul exhalations which rise (particularly in summer evenings) from such sewage farms. It is only possible to produce a suitable effluent from raw sewage by irrigation when there is a sufficient depth of porous soil as a filtering medium, and, further, a large enough area to allow of a change of top soil from time to time by ploughing or other means. If these conditions cannot be complied with, sewage irrigation becomes absolutely impossible, on account of the choking-up of the surface of the land by the "sewage slime." Looking at this branch of the subject from another point of view, it is an outrage upon all natural laws. Plant life takes up its nourishment from manures, either liquid or solid, in very small quantities at a time, and only at certain seasons. At other times the presence of such manure would be absolutely useless to the plant, and probably detrimental to its progress. From this it is evident that plant life on a sewage irrigation farm must be in anything but a really healthy condition if the work of sewage purification is to be carried out day and night for the whole year, for many a time when it ought to have rest the plant would be deluged with sewage matter which it cannot assimilate, or at other times when it really wants support it cannot obtain it, because the surface of the ground being completely choked with sewage-slime, the roots of the plant are deprived of the necessary aëration on the one hand and sun's action on the other. Further, in deep winter, when the ground is frozen hard, the raw-sewage cannot be purified at all, and is generally discharged in that condition into the nearest stream. The same thing occurs in summer in some places where hay is a crop grown on the farm, no raw or even settled sewage being allowed on the hay-grass for some considerable time, and consequently the crude sewage passes unpurified into the nearest stream as a matter of course. I have had personal experience of this partial treatment on many occasions, and in all, a fearful nuisance was created by the discharge of this crude sewage into brooks which were otherwise clean, and injunctions were obtained by property owners on these streams against the local authorities who were the offenders. There cannot be any doubt, therefore, that simple treatment of sewage by passage over land, either good or bad, is quite unsuitable and dangerous to the health of the community. Even sewage irrigation supplemented or preceded by settlement of some of the suspended matters is also a proved failure, as all the objections cited above are equally applicable to this modification. Many local authorities have adopted this or some similar treatment on account of its so-called cheapness, but they will

shortly be made aware by the County Councils that their disgusting effluents cannot any longer be tolerated in our streams; therefore, they must eventually adopt an entirely different treatment of their sewage if they wish to avoid unpleasant consequences.

I come now to the second method of treatment, "intermittent downward filtration." Where this process is carried out upon crude untreated sewage, I have no hesitation in saying that it must result in failure for the same reasons given above, that irrigation is a failure, and local authorities will certainly be compelled to modify and supplement their sewage treatment where simply intermittent downward filtration is adopted. For large towns in populous manufacturing districts such a plan of sewage treatment is quite impossible, on account of the enormous area of land which would have to be acquired for the purpose, it being understood that not more than the sewage from about 400 people should be drained upon one acre of good filtering land. Some authorities go as high as 1,000 of population to one acre of the very best filtering land, and as low as 250 of population to one acre of bad filtering land. I consider it quite impossible to filter the sewage from a population of 1,000 upon an acre of the very best filtering land, and also 250 or even 100 of population upon an acre of bad filtering land. Bad filtering land ought not to be applied to such a purpose under any circumstances whatever.

I do not think it necessary to go into this part of the question any further, because every one who has had any experience at all in sewage treatment has long been of opinion that filtration of raw sewage without a previous purifying treatment is obsolete. It will be seen later on that purified or treated sewage, if passed over suitable land or filters of sufficient area, gives an excellent filtered effluent which is quite fit to turn into any stream. Before considering some of the various chemical or "precipitation processes" I think it will be more convenient to briefly describe the general chemical alteration which domestic sewage undergoes when mixed with water, for water-borne sewage is now the rule and not the exception, therefore those places where the dry earth or the pail systems are adopted being few and far between, such methods of treatment need not be considered in a paper on sewage treatment.

Domestic sewage contains nitrogenous and carbonaceous bodies, both in solution and in suspension, those present in the latter being fæcal and most objectionable in character, although not more dangerous from a sanitary point of view than the dissolved nitrogenous and carbonaceous matters. In this sewage matter (principally that in solution) there are sulphates of the alkalies and alkaline earths, calcium phosphate, and the so-called albuminoid matters. The great decomposers are in reality numerous species of micro-organisms of all classes, micrococci, bacteria, bacilli, &c., which split up the above-mentioned albuminoid and carbonaceous bodies into simpler bodies, the final results of their activity being ammonia (obtained principally from the albuminoid matter), carbonic acid gas, obtained by the oxidation of the carbon of the various matters, both albuminoid and carbonaceous (for the albuminoid matters also contain carbon as a constituent), sulphuretted hydrogen obtained by the reduction of the sulphates mentioned above, by the liberation of nascent or atomic carbon and its immediate recombination with the oxygen of the sulphates themselves, resulting in the production in the first stage of carbonic acid gas or carbon dioxide and calcium, potassium, or sodium sulphide; according to the following chemical equations:—

$$CaSO_4 + 2C = CaS + 2CO_2$$
$$K_2SO_4 + 2C = K_2S + 2CO_2$$
$$Na_2SO_4 + 2C = Na_2S + 2CO_2.$$

Now we do not find in sewage which is freely acted upon by the oxygen of the air, any sulphides of the alkalies or alkaline earths, but we always do find a considerable quantity of a black insoluble precipitate or deposit at the bottom of a tank or brook in which sewage has been exposed for some days to the air, and on analysis we find that this black substance is a sulphide of iron. How does it get there? As an excess of carbonaceous matter is always present in domestic sewage, the action of the micro-organisms produces from it (assisted by the oxygen of the air) a large quantity of carbon dioxide, which largely dissolves and is retained by the water; in fact, decomposed sewage is saturated with dissolved carbon dioxide. This carbon dioxide dissolved in the water now attacks the above-mentioned sulphides and converts them into carbonates liberating at the same time sulphuretted hydrogen gas, some of which is liberated from the water in the form of bubbles which soon make their presence evident by their very characteristic smell, whilst another portion of the sulphuretted hydrogen combines with any suitable iron compound in its immediate neighbourhood which may be present in solution, or, failing that, suspended hydrated ferric oxide derived from various sources, which is generally present in the beds of most brooks or rivers. In any case this black sulphide of iron is produced and carbonates of the alkalies and alkaline earths are also produced. This production of these carbonates from the sulphides constitutes the second stage of the reaction mentioned above, and it takes place according to the following chemical equation, viz.:—

$$CaS + CO_2 + H_2O = CaCO_3 + H_2S$$
$$K_2S + CO_2 + H_2O = K_2CO_3 + H_2S$$
$$Na_2S \times CO_2 + H_2O = Na_2CO_3 + H_2S.$$

This then is what occurs when sewage is freely exposed to the action of the air. When the air is wholly or partially excluded, the reaction is somewhat different, the production of carbonates being much smaller in amount, whilst the ammonia produced from the albuminoid bodies mostly combines with the sulphuretted hydrogen (which in any case is always present in more or less amount in decomposing sewage, even when free oxygen is almost absent), forming a solution of ammonium sulphide, a most foul smelling and dangerous compound. I have known this substance to be produced very largely upon filter beds which had become completely choked and would not any longer allow the passage of water through the filtering medium, the stagnant sewage lying upon the beds to the depth of about 2 ft. It was this depth of liquid which caused the mischief. Oxidation could only take place upon the surface, and the bulk of the liquid gradually became strongly charged with ammonium sulphide. On exposure to air ammonium sulphide rapidly decomposes into free ammonia, water, and free sulphur, the latter making its presence evident by forming a film of sulphur upon the surface of the sewage.

The micro-organisms continue their useful work and increase enormously in number until the unoxidised carbonaceous matter is oxidised as much as it can be, and until all the albuminoid bodies are decomposed and resolved into less complex bodies. When the process is complete most of these organisms die; in fact, there is no doubt that some of the products of their activity are poisonous to them, and perhaps also to mankind. Albuminous bodies which undergo a similar decomposition produce highly poisonous products sometimes, to which the name ptomaines has been given; these ptomaines are found in decomposing flesh, &c., and closely resemble both chemically and physiologically some of the well-known alkaloid poisons. In addition to the above-mentioned decomposition products there are two substances always present at the end of the process, not definite chemical compounds, but still, chemically speaking, always similar in their characteristics. One of these substances is insoluble in water, gum-like in character when concentrated, but flocculent when in oxidised sewage. This insoluble gum-like body is a product of the oxidation of the albuminous and carbonaceous bodies in the original sewage, and is the substance which is most detrimental to the action of a filter, because it chokes up the pores, owing to its slimy consistency. The second substance, which is present in decomposed oxidised sewage, is soluble in water, gum-like in character, and not further oxidisable except by strong chemical oxidisers, and only then in a very partial manner. It is quite harmless in water. From the above-mentioned facts it is evident that micro-organisms are not altogether objectionable in character. They perform a good work for us, and assist us largely in sewage purification. They certainly take a long time to carry out their operations, but this seems to me to point out a direction in which to work, namely, to utilise these countless organisms as purifiers of the final effluent from our sewage treatment. Treat the sewage by the best and most convenient process first, and then leave these organisms to complete the work of purification in their own way.

The decomposition of raw sewage or effluents which is brought about by micro-organisms or other causes is termed "secondary decomposition." The same kind of decomposition takes place in moist or wet sewage mud or sludge, hence the objectionable smell occasionally observed on visiting sewage-works. I append to this paper some results of my analyses of sewage-muds, giving the principal constituents. I shall consider the sludge question at a later stage; it is the most difficult part of the problem, as most of us know. I think I may safely say that both irrigation sewage farming and filtration of raw sewage over or through land is a proved failure, and further that at last the inevitable day of chemical precipitation, supplemented by filtration either through specially constructed filter-beds or over properly prepared filtering land, has arrived and will be the only possibly efficient way of purifying sewage in order to fulfil the requirements of these days in regard to it. We cannot any longer allow sham or inefficient processes to be put up on our local rivers for dealing with sewage, because nothing less than absolute efficiency will be allowed if the Manchester Ship Canal is to be a possible waterway to Liverpool and the sea. If some of the present inefficient schemes are not considerably modified, I firmly believe that the Irwell water will be too foul for storage in docks, unless the deposit is often cleaned out from the said docks completely. This applies equally to the canal itself. No half measures can be allowed in this case, nothing less than the very best process or processes that science can devise for the treatment of sewage must be adopted for any locality ultimately draining into the river Irwell or any of its tributaries. When I speak of sewage in the Irwell and its tributaries, or any other river, I refer to both domestic and manufacturers' sewage. All of it can be efficiently and easily dealt with now, and there is no reason why the Ship Canal need be troubled with putrescent sewage at all.

Having considered the treatment of sewage by irrigation, and also intermittent downward filtration unassisted by chemical precipitation, and also the decomposition phenomena observed when sewage undergoes secondary decomposition, I will now pass on to the consideration of what are known as precipitation processes. I may say at once that I shall only consider those processes which have been for some considerable time in actual practical operation in this country, and further been examined and tested practically by the Corporation of the County Borough of Salford. In the years 1890 and 1891 I had the honour of being appointed the referee chemist to the Salford Corporation on the series of important tests of leading sewage processes, which were carried out at the Corporation Sewage Works at Weaste, upon the mixed sewages of the borough. As is well known, the sewage works at Weaste are designed for the treatment of the sewage by what is known as the lime-process. It is unnecessary to describe the works in this paper, but for those who have not any knowledge of them the Salford Corporation have printed a small pamphlet describing it thoroughly, giving at the same time careful drawings of the tanks, &c.

I think it may be safely asserted that the lime precipitation process is the oldest precipitation process at present in use. For many years it apparently satisfied the requirements of particular localities and no complaints were heard of it, but this "golden age" of the lime process was really fostered by the happy ignorance of the public as to its real character. They thought it produced beautiful, clear effluents, and, best of all, was very cheap. We know to-day that it may be cheap, but it certainly is exceedingly nasty. During the last ten years chemical science has demonstrated beyond any further discussion that an alkaline effluent (where the alkalinity is due to excess of free caustic lime) is one which is more liable to produce secondary decomposition and consequent nuisance than a neutral or even acid effluent, the reason being the fact that the putrescible insoluble organic matters in suspension are decomposed by the caustic lime and made soluble in water, consequently the effluent water from such a treatment contains in solution a very large amount of partially decomposed organic matter, derived principally from fæcal matter in a peculiarly putrescible condition. Further, the

albuminoid and other putrescible bodies in solution in the original sewage are converted into unstable compounds which also appear to undergo secondary decomposition with greater facility than they do in the original sewage, after being submitted to the chemical action of caustic lime; consequently, in reality the so-called purified sewage is worse than the original raw sewage, so far as secondary decomposition is concerned. Unfortunately, this state of affairs is not materially altered by subsequently filtering the lime effluent through any kind of filtering medium, either through land or specially-prepared filters of the very best construction. This is accounted for by the fact that the unstable organic compounds referred to are in solution, and also, of course, partially oxidisable; consequently, the land or the filter becomes rapidly choked by the deposition of the slimy, sticky, insoluble, gum-like substance already mentioned above, as being produced by the oxidation of organic matter in sewage. In my experience of the lime process, both with and without filtration, I can only confirm the already expressed opinion of other chemists, that the lime process is a delusion and a snare, so far as purification of sewage is concerned, and it ought no longer to be allowed to discharge its filthy effluents into streams in a populous district. It is an absolute failure. I have said that it is cheap, but if its adoption leads to subsequent costly litigation (as I have known it to do), its cheapness also is part of the delusion connected with it. Another most serious objection to the process is the putrescent character of the sludge and its increased weight. The organic matters mechanically carried down with the lime in suspension decompose more easily in the presence of free caustic lime than they otherwise would; therefore, before the sludge is removed from the tanks it is already in a state of active decomposition, and very foul. When this sludge is pressed in filter-presses, a putrid, foul-smelling water runs from the presses, which is very much worse in quality than the original sewage, and must be immediately dealt with if a nuisance is to be avoided. I may say here that I shall not consider the question of cost of any of the processes, although, of course, that is a very important consideration, but only the purely chemical side of the question. The cost must be ascertained by the engineer, and by the alliance of the engineer and the chemist, and in no other way can the great sewage problem be solved.

[We have not space for the remainder of Dr. Burghardt's paper, which treated of other precipitation processes in some detail.]

Correspondence.

To the Editor of THE BUILDER.

DRAINAGE.

SIR,—Some years back I designed and carried out a mansion in Kent. At that time my house was the first on the estate, and there was no system of sewage near. Cesspool drainage was the only relief, and as my client had twenty-seven acres of land, I constructed the sewage tanks a considerable distance from the house. Twenty-two years passed (my client died in the meantime), and his son called and asked for a copy of the drainage plan, which was supplied. He returned it in a few days informing me that the plan was inaccurate, and that the system was wrong. "Well," I said, "you have taken a long time to make the discovery, and can't say who has tinkered the drains since I put them in. You have now a public system of drainage, but I could not connect the drains of your father's house, as in his time it had no existence."

My object, however, is not to tell this story, but to suggest that it may be well to adopt the custom, after testing, to have each line of drains photographed, and make a charge for the operation, give client and builder each a copy, and retain two copies to put away with the papers,—a course I am adopting. I state it for what it is worth. T. E. KNIGHTLEY.

106, *Cannon-street, E.C.*, August 10.

DUST-EXCLUDING RESPIRATORS.

SIR,—Can any of your readers give the address of the manufacturers of respirators for excluding dust from the mouth of workmen and others in workshops and factories? These respirators have been long recommended for use by masons and others, but hitherto, I fear, without much effect.

E. W.

The Students' Column.

CONCRETE.—VIII.

ARTIFICIAL CEMENTS (*continued*).

PORTLAND: IMPORTANCE OF TESTING.

THE necessity of testing Portland cement before using it in important works is recognised by all engineers, and ought to be recognised by all architects. It may be argued that, if the cement be obtained from a firm enjoying a good reputation, there is no need for tests. There is, perhaps, less need for them, but they ought not to be altogether omitted. In this day of advertisement, it is often difficult to ascertain whether a reputation is founded on good manufacture or on advertisements; and even if the cement from a reliable manufactory has been specified, there is a possibility that another kind may be used instead. Another argument that may be advanced is that the contractor is responsible for failures in material, and that, if by using inferior cement the concrete should fail, he will have to do the work again at his own cost; therefore, the *onus* of testing, it may be said, rests upon him. A moment's consideration will show how unfair to the building-owner is such a view of the case; for the building-owner may have to bear the loss by delay consequent on the failure of the cement, or may be able to recover damages only after an anxious lawsuit. Again, there is a grave danger that the bad character of the cement may not discover itself until some months have elapsed, perhaps not until the architect's final certificate has been granted, and, in the latter case, there will probably be trouble for architect and contractor, as well as for the building-owner; and further, a cement may be used which produces concrete sufficiently good to escape condemnation, but which is far from being the best which could have been obtained under the terms of the specification, and in this case the building-owner is decidedly the loser because proper tests were not carried out. When we think of the important uses to which concrete is put in our buildings,—as, for instance, foundations and floors,—we cannot fail to see the necessity of knowing the character of the cement,—which is its most important ingredient. To specify that "the best heavy Portland cement" must be used is not enough, but such a description is far from uncommon. Quite recently a case came under the author's notice in which the concrete for an engine-bed was specified to be of cement, vaguely described as in the last sentence, and of broken stone, &c., in the proportion of one to four,—a proportion of cement to aggregate which ought to have insured an excellent concrete; but what happened? The concrete was deposited and set properly, but after a month it began to show signs of disintegration, and it gradually crumbled until the architects had to order its removal; the contractors removed it and laid a new foundation, and on the completion of the whole building claimed an "extra" for the work. The architects refused to allow the claim, but, believing that the contractors had not wilfully used inferior material, they asked the building-owner to deal generously with the unfortunate builders. Altogether a very pretty muddle, and one which probably would have been avoided if the cement had been submitted to one or two comparatively simple tests.

Test Specialists.—We do not mean to say that architects must fit up a part of their offices as testing laboratories, and themselves become proficient in the art of making and breaking briquettes, &c. No, architects have quite enough on their hands without taking up another burden. The necessary appliances for testing are many and costly, and the testing itself is no easy matter. For instance, it requires considerable practice to carry out properly the many operations necessary in ascertaining the tensile strength of cement. That proportion of water which is most suited to the character of the cement must be learnt; the requisite amount must then be weighed, and thoroughly mixed with the cement, care being taken that the water, cement, and air are at the uniform temperature of about 60 deg. Fahr.; the moulds must next be thoroughly filled with the cement paste, and kept in a moist atmosphere for a certain time (usually one day), after which the briquettes are released from the moulds and placed under water kept at a temperature of about 60 deg. for a further period or periods (sometimes two or six days, sometimes twenty-seven or more). The briquettes must be accurately placed in the testing-machine, and the strain should be applied regularly and not too slowly. Even the weighing of cement is not as easy as one would imagine, and when it is remembered that the fineness, soundness, and specific gravity are of importance, it will be understood that architects cannot be expected either to learn how to test cement or to provide the apparatus required in carrying out a series of tests. But nowadays there are specialists of all kinds, and cement-testing is not without its specialists. For large works, a clause might be inserted in the specification to the effect that the contractor must include a certain sum for cement-testing, the tests to be carried out by a specified person or by one to be approved by the architect. For small works, the cement might be specified to be obtained from a particular maker, and the architect or the clerk of works could easily test the cement as to its "soundness," taking its fineness and strength for granted.

Tests.—The tests now considered of primary importance are those for ascertaining the fineness, tensile strength, and soundness of the cement. The specific gravity is also thought by many to be of importance; but the weight, which at one time was considered the most notable characteristic (perhaps, because it could be ascertained with comparative ease), does not now command very much attention, and is only considered in connexion with the fineness and specific gravity. Some years ago a vague specification would have required "the best *heavy* Portland cement;" to-day the description would probably be altered to "the best *finely-ground* Portland cement," provided, of course, that the author of such a vague description as the first could be induced to make any alteration at all. Several other tests have at various times been adopted, such as those made to ascertain the relative hardness of different cements, their resistance to transverse and crushing stresses, and their adhesive strength; these have their uses, but are seldom specified in England.

The colour of cement affords little evidence of its quality, as in many instances it is due mainly to the presence of iron. Sometimes, however, a yellowish hue is the result of underburning, and if that be the case, the cement will prove comparatively weak, and may be unsound. As a rule, good Portland cement is of a bluish-grey or dark-grey colour, and is soft to the touch.

It is probable that in the near future a microscopic examination of Portland cement will be almost, if not altogether, sufficient to enable the observer to judge of its value; the researches of Mr. Alden H. Brown, of the University of Iowa, seem, at any rate, to point to this conclusion, but sufficient observations and experiments have not yet been made to obtain absolute proof of this.

When it is desired to test a consignment of cement, a small quantity should be taken from each of several casks or bags immediately on their arrival, care being observed that the cement is not taken from the outermost portion in the cask or bag, but from the interior. If the test is to be made by some one at a distance from the works, the sample should be carefully packed and sent as soon as possible. As a rule, not more than 28 lbs. of cement will be required for testing.

Weight.—The weight of Portland cement is stated in a well-known book to vary from 95 lbs. to about 130 lbs. per striked bushel. To-day manufacturers produce cements apparently more uniform in weight than these figures show. The chief causes of this smaller difference are the better knowledge which is now possessed of the ingredients of good cement, the more uniform degree of fineness to which it is ground, and also the greater care with which the weight is ascertained. The method of filling the measure has much to do with the apparent weight; it may be filled very lightly by allowing the cement to fall down a short shoot of easy slope, or may be more closely filled if the cement drop vertically into it from some height; or, still more compactly, if the measure be shaken during the filling. The necessity for some uniform and satisfactory method of ascertaining the weight has long been recognised, and various devices have been adopted for this purpose. In some cases the measure is filled from a short shoot, down which the cement slips at a moderate velocity. In others, the

cement is put into a coarse sieve from which it drops into a measure placed, say, 3 ft. below it. Mr. Henry Faija, M.Inst. C.E., has devised an apparatus which ensures uniformity of filling; the cement is placed in a hopper, from the bottom of which it passes into a trough; on turning a handle a worm in this trough revolves and gradually conveys the cement forward to an opening, whence it drops directly into the measure below. When the measure is piled full, the cement is struck off level by means of a straight-edge and then weighed; the weight of the measure itself, which has previously been ascertained, is deducted from the total, and the balance is the weight of the cement contained in the measure. Sometimes the measure in which the cement is weighed contains only part of a bushel, and this is another cause of discrepancy, for in a larger measure the cement is more compressed than in a smaller one, and the weight therefore appears greater. Mr. John Grant ascertained that 10·75 measures, each containing one-tenth of a bushel, were required to fill one bushel measure. In other words, if the weight per bushel were 107·5 lbs., the weight per tenth of a bushel would be only 10 lbs., which, multiplied by ten, would give an apparent weight per bushel of only 100 lbs., a difference of 7½ per cent.

The freshness of the cement has also a considerable influence on the weight. It has long been known that the storing of cement increases its bulk without corresponding increase of weight. This is due to the slaking, by the moisture of the atmosphere, of the quicklime or calcium oxide contained in the cement, and its conversion into the more bulky hydrate of lime. Therefore, the more thoroughly slaked the cement is, the less does it weigh per bushel. Some cements, of course, show considerably more increase in volume and decrease in weight per bushel than others. Experiments by Mr. Faija (see *Proceedings, Society of Engineers* 1888) showed that a cement which just after grinding weighed 120 lbs. per bushel, might when a few days old weigh only 112 lbs. or 114 lbs., when six months old 100 lbs., and at the end of a year not more than 95 lbs.

The weight of cement varies also according to its fineness. The finest cement, other things being equal, weighs the least. Mr. John Grant gives the weights of seven varieties, unsifted, and sifted through a sieve with 2,304 meshes per square inch. The average weight of the unsifted cements was 11·04 lbs. per tenth of a bushel, while the siftings weighed only 9·54 lbs. for the same quantity,—a decrease of more than 13 per cent., or about 16 lbs. per bushel. Dr. Michaelis instances one excellent cement, which, as ordinarily ground, weighed 90 lbs. per cubic foot (about 115 lbs. per bushel), but which, when ground so that all passed a sieve with 32,000 meshes per square inch, weighed only 70 lbs. per cubic foot, or about 90 lbs. per bushel.

A higher degree of calcination yields a heavier cement, and the composition of the cement also affects the weight.

From this evidence it is clear that the weight of a cement, taken by itself, is no criterion of the cement's value. A heavy cement may be fresh, and coarsely ground; on the contrary, it may be well-burnt. A light cement may be under-burnt; on the contrary, it may be free from unslaked lime, and finely ground. Both may give equally good or bad results as to strength and stability. The weight is valuable only when taken in connexion with other particulars, but the best Portland cements, when received from the manufacturers, will be found to weigh within 5 per cent. (more or less) of 112 lbs. per striked bushel.

Specific Gravity.—Among engineers there has been, of late years, a growing idea of the importance of ascertaining the specific gravity of cement, but the variation in the specific gravity of different cements is so small that the very slightest error may lead to quite wrong conclusions. Mr. John Grant in 1879-80 declared that, in his opinion, it was not of much practical benefit; the specific gravity of thirty or forty cements, which he had tested, ranged from 3·193 to 3·040, the extreme variation being, therefore, less than 5 per cent. Other experimenters (Mr. Mann and Mr. Faija, for instance) have found greater variation, the specific gravity in some cases being as low as 2·77. Again, the specific gravity of some kinds of Portland cement is practically identical with that of blue lias lime, and this, in our opinion, throws considerable doubt on the value of the test. Mr. Faija, in his valuable little book, "Portland Cement for Users," gives a table of the testing of fifteen samples of cement; from this table we extract the figures relating to two samples, which are almost identical in weight specific gravity, and fineness, but which differ, exceedingly in strength and hydraulic activity.

TABLE XII.

Variableness of Cement.

	Weight per striked bushel.	Specific gravity.	Residue per cent. after sifting through sieves, Nos.			Broke at lbs. per sq. in. of section at — days from gauging,			—
No.	lbs.	—	25	50	75	7	28	182	
3	111	2·89	½	21	32	510	647	772	Quick-setting.
10	110	2·90	1	21	31	332	401	460	Slow- ,,

The tensile strength in each case is the average of ten briquettes, which were kept in water from the time of gauging. The table is interesting as showing that Portland cement must not be judged either by its weight or its specific gravity, or its fineness, or even by these three particulars taken together, but must be actually made into briquettes and broken before its character can be accurately determined.

Mr. Faija considers that the specific gravity should never be less than 2·92, but other authorities hold that cement a month old should have a specific gravity of 3·1 to 3·15. A high specific gravity, combined with extreme fineness, indicates that the cement is well burnt. A specific gravity of less than 2·9 indicates an imperfectly-burnt or stale cement.

GENERAL BUILDING NEWS.

NEW BANK PREMISES AT BIRMINGHAM. — A new branch bank has just been erected for the Birmingham District and Counties Banking Company, Limited, at Hockley. The building has been erected at the corner of Hockley-hill and Well-street. The entrance doorway is placed at the angle of the two frontages. The style is Italian, the exterior being of brick and stone, with a small quantity of terra-cotta. The facing bricks and terra-cotta were supplied by Messrs. King & Co., of Stourbridge; the stone is partly Hollington, and partly hard Derbyshire. The telling-room measures 33 ft. by 27 ft., and is 17 ft. 6 in. in height. The ceiling is of cement concrete. A large private room adjoins it, and a strong room, &c., is also provided. The builders were Messrs. James Moffat & Sons. Mr. Cooper Whitwell is the architect. The same company have commenced the erection of a new branch bank at Aston Cross by the same architect, Messrs. James Smith & Son being the builders.

CATHOLIC APOSTOLIC CHURCH, WOLVERHAMPTON.—On the 2nd inst. the foundation stone of the new Catholic and Apostolic Church, in course of erection in Bath-road, Wolverhampton, was laid by the Rev. A. Inglis, B.A. According to the plans, there are two porches at the west end of the church and also an entrance at the east end, which is reserved for the priests and members of the choir. The baptistery and morning chapel are not included in the present scheme. The nave will consist of an arcade of five arches on each side, and will be 57 ft. 2 in. long, including the lower choir. The nave is 22 ft. wide between the piers, and is provided with benches for the laity, with a passage reserved down the centre about 4 ft. wide. The north and south aisles will be provided with chairs for the congregation, the total number of sittings in the nave and aisles being about 300. An organ-chamber is provided, together with a space for the choristers. The chancel, which consists of a portion of the lower choir, the upper choir, and the sanctuary, with an ambulatory, is about 40 ft. long and 22 ft. wide. The floor of the altar platform is furnished with mosaic pavement, from a design by the architect. All the external facings are executed in pressed sand-faced red bricks, and the stone dressings to windows, doors, &c., in white Hollington stone. The style adopted is Early Gothic. Mr. Henry W. Rising, of London, is the architect, and Mr. Henry Lovatt, of Wolverhampton, is the builder.

CO-OPERATIVE BUILDINGS, PLYMOUTH. — New central stores are being erected in Frankfort and Courtenay streets, Plymouth, by the Plymouth Mutual Co-operative and Industrial Society, Limited. The exterior is being built in red brick, with Portland stone dressings. The building is five stories high, the height to the roof being 90 ft., while the tower over the main entrance rises to a height of 130 ft. To the building at present in course of construction there will be three main entrances. All the doorways will be of different character, with polished Peterhead granite jambs and pilasters, and carved arches and pediments. The doorway at the corner of the two streets has an arch with a large carved keystone supporting an angle turret, which runs the whole height of the building. This arch will have carved figures in the spandrels. The ground floor will be occupied by retail stores, with the exception of the two main entrances to the upper part of the building. From each of the three entrances there is a staircase running the full height of the building. That to the Hall will be of stone, with iron girders. The first floor will be mainly occupied by show-rooms connected with the ground-floor businesses, and by the general offices of the society, including the manager's room. The second floor will contain the large hall, the dimensions of which are 80 ft. by 42 ft., and on this floor there will also be committee-rooms and additional offices. The hall will have a large gallery at one end, and a platform at the other. There will also be kitchen, serving and retiring rooms, for use on festive occasions. The hall will be lighted by twenty large windows, which will be filled with stained glass. The ceiling of the Hall will be formed in three curves, and will be panelled. The third floor will comprise library, reading-rooms, and recreation-rooms. The fourth story contains some additional store-rooms or work-rooms, and a residence for the caretaker. In the centre building there will probably be three lifts,—two in the portion now in course of construction. The architect of the building is Mr. H. J. Snell, of Plymouth, and the contract for the shell of the building was let in 1889 to Mr. A. R. Debnam, also of Plymouth.

NEW BREWERY, TOTTENHAM.—Messrs. Reed, Blight, & Co. (Limited), contractors, Plymouth, have been selected (without competition) by Mr. W. Bradford, brewers' engineer, for the erection of an extensive brewery at Tottenham for Mr. H. B. Woolridge. The work is to be proceeded with at once.

NEW MARKET HOUSE, BILSTON.—On the 9th inst. the new Market House at Bilston was opened by Sir Alfred Hickman, M.P., J.P., &c. The building is of pressed red bricks, with terra-cotta facings, and was designed by Messrs. Horton & Co., of Wednesbury, and the walls and roof were built by Messrs. Dorse & Sons, of Cradley Heath, at a cost of 4,819*l.* 11s. 6d., including extras. The shops and stalls were built from plans and specifications prepared by C. L. N. Wilson, C.E., Township Engineer, the contractors being Morrell Bros., of Bilston, their price being 1,760*l.* The hall is 300 ft. long and 65 ft. wide. There are forty-five lock-up shops: eleven for butchers, provided with hanging-rails, sliding-pulleys, &c., and ash blocks; eight fish-shops are provided, with white marble slabs and enamelled brick fronts, water being laid on to each fish-shop, which is also drained separately. The remaining twenty-six shops are for general goods; there are also forty lock-up stalls and fifty-five open stalls, complete with market-inspector's office, store-room, &c. The concrete floor was laid by Mr. Wilson, with his own men, at a cost of 529*l.* 0s. 1d. The whole of the building is lighted with the electric light. The boiler is one of Davey, Paxman, & Co.'s "Loco." type. The engine is Robey's 9 in. by 8 in. cylinder horizontal, making 250 revolutions per minute with 80 lbs. steam. The whole of the electric lighting plant was put down by the Brush Electric Engineering Co., London (Manchester Branch), under the supervision of Mr. Wilson, C.E., Township Engineer, who designed the engine and boiler-houses which were built by Messrs. Morrell Bros. The electric light plant cost about 750*l.*, making the total cost 7,858*l.* 11s. 7d.

BRITISH ARCHÆOLOGICAL ASSOCIATION. — The forty-ninth annual congress of this Association is to be held next week at Cardiff.

SANITARY AND ENGINEERING NEWS.

Sewage Disposal Works, Castle Cary.—The first sod of the new sewage disposal works, Castle Cary, Somersetshire, was cut by Mr. F. S. Moore, of Castle Cary, on the 27th ult. The undertaking comprises an extension of the present sewer to about half a mile farther from the town. At the outlet there will be constructed four large settling-tanks, sludge well, and four large filter-beds, the effluent being finally passed over about five acres of land, which will be specially prepared by deep drainage, for the purpose of purification before its discharge into the river. The cost, including the purchase of land, will be about 3,000*l*. The works have been designed by Mr. E. Cousins, C.E., of London; and the contractors are Messrs. Francis, of Castle Cary.

Weybridge Sewerage.—At a meeting of the Chertsey Rural Sanitary Authority, on the 2nd inst., Mr. W. H. Radford, C.E., Nottingham, was appointed engineer for the sewerage and sewage disposal of Weybridge and Oatlands, and was instructed to prepare plans and estimates for submission to the Local Government Board. It is proposed to collect the whole of the sewage of the district by gravitation at one point in Weybridge, whence it will be pumped to the sewage-disposal site on Hollick's Farm, in Chertsey parish, and there purified by chemical precipitation in tanks, followed by filtration through twenty-eight acres of land.

The Absorption and Filtration of Sewage on Sandy and other Soils.—To Section G of the British Association, Mr. Richard F. Grantham, M. Inst. C.E., submitted a paper on this subject. The author refers to what were described as the remarkable results of the experiments conducted for the last two years at St. Lawrence by the Massachusetts Board of Health upon the filtration of sewage. The results are compared with instances of sewage farming upon sandy soils. The examples of sewage irrigation at Edinburgh, Dantzic, and Berlin are described, and the effect upon the sandy soil in each case, as well as the average quantity of sewage treated per acre per day, is alluded to. The particulars of the filter tanks constructed and the materials used by the Massachusetts Board in their experiments are stated, and a table is given to show the quantities treated and the effect upon the nitrogenous matter. The tanks were 6 ft. deep, built water-tight; 17 ft. 4 in. in diameter at the top and 16 ft. 8 in. at the bottom. Two-inch drain-pipes and a thickness of 1 ft. of gravel and sand, decreasing in coarseness upwards, were laid and spread at the bottom. Above this layers of sand and of gravel and other materials were placed in several tanks. The sewage was delivered on to the surface of the filters intermittently. The volumes of sewage dealt with in sewage farms are contrasted with the quantities experimented upon, and Dr. Frankland's experiments for the Rivers Pollution Commissioners are shown to corroborate the results of the Massachusetts Board's investigations as regards the quantities and degree of purification. The action of the filters is shown to be not merely in straining the sewage, but in consuming and destroying the organic impurities, and this action is due to the presence in it of organisms which require a supply of oxygen for their existence and multiplication. The interstices in the sand and gravel afford air-spaces for these organisms to multiply; but top soil and mould retain so much moisture that, although the bacteria are filtered out, a large percentage of albuminoid ammonia is left in the effluent. From the quantity of sewage disposed of on the Berlin sewage farm per acre and from that ordinarily absorbed by intermittent downward filtration are calculated the areas of land that according to the same ratios would be required for the disposal of the London sewage, and these are compared with the space required for the volume according to the ratio shown by the experiments. It is suggested that there would be no difficulty, from the nature of the formation of the Maplin and Foulness Sands, in reclaiming and underdraining them and laying them out for filtration areas.

STAINED GLASS AND DECORATION.

Memorial Window, Thornbury Church, Gloucestershire.—On the 31st ult. a stained-glass window which has been placed in the south aisle of St. Mary's Church, Thornbury, to the memory of Mr. Joseph Young Sturge, was unveiled. The window, which has been erected by Mr. A. O. Hemming, of London, represents Our Lord blessing little children.

Decoration of Christ Church, Ashton-under-Lyne.—According to the *Manchester Courier*, the decoration of Christ Church, Ashton-under-Lyne, has just been completed by Messrs. R. Bennett & Co., of Manchester. The general colours of the nave are cream and terra-cotta grounds enriched with stencil ornaments in moss greens, ambers, &c. The spandrels of the arches contain emblems in foils, surrounded by foliage, &c. The tones of the chancel are richer, gold being freely used. The chief figure-subject is that above the chancel arch, which depicts Christ seated on the throne in glory, surrounded by attendant angels. The work over the east window represents the descending Dove. The picture of the Good Shepherd is contained in an oblique panel at the foot of the chancel arch. These three pictures are executed in sienna monochrome. The six panels of the east wall on either side of the altar are treated with figures in natural colours on gold ground, and represent angels in varied ministrations. The whole of the figure work has been executed by Mr. H. G. Hiller, of Manchester.

Stained Glass Window, Aston Church, Rotherham.—A stained-glass window of two lights, illustrating the subjects of The Baptism and Resurrection of our Lord, has been inserted in this church. The window is the gift of Miss Senior, of Aston Common, and was designed and executed by Messrs. Warrington & Co., of London.

FOREIGN AND COLONIAL.

France.—The work of enlarging the Paris, Lyons and Mediterranean terminal station is to be commenced shortly. According to the scheme approved by the Minister of Works the existing station buildings will be retained and prolonged along the Rue Bercy, which will be displaced. The cost is estimated at 16 million francs, 5 millions being for compensation to owners of property disturbed.——The enlargement of the École de Droit will also be commenced shortly. 1,223,000 francs will have to be expended in the purchase of property. The work, which will be commenced on the 22nd of this month, will involve the demolition of all the houses between Rue St. Jacques and Rues Soufflot and Cujas.——The Government has offered to the Luxembourg Museum a fine picture by M. Fantin-Latour, which obtained a great success in the Salon of 1870. It is entitled "Un Atelier aux Batignolles," and includes the portraits of MM. Zola, Manet, Renouard, Alfred Assolant, Paul Verlaine, &c.——A Committee has been formed at Montauban to raise a monument to the novelist Léon Cladel, recently deceased. ——The jury of the International Exhibition of Fine Arts at Munich have awarded first-class medals to the following French painters: MM. Aimé Morot, Rochegrosse, Bail, Henri Martin, David, and Millet, as well as to M. Lamiet (sculptor) and M. Leterrier (engraver).——The jury of Architecture at the Ecole des Beaux-Arts has given judgment in the competition of students of the first-class, and has awarded second medals to MM. Lefebvre, Umbenstock, Boucher, Renavay, and Cailleux.——The military authorities have commenced the work of dismantling the ancient fortifications of the town of Arras, beginning with the Porte Baudimont.

Budapest.—There is great activity in the building trades here this year, owing to a large number of business premises being in course of erection. These buildings, generally situated on the great radial thoroughfares of the city, show façades which, thanks to their careful architectural treatment, deserve more attention than similar ones to be found in other Continental capitals.——The number of palatial residences in course of erection is small, as the majority of the Hungarian magnates have now seen the completion of their new town residences. The few palaces not yet completed for the most part belong to the Catholic prelates, who have but latterly decided to compete with the aristocracy in the beautification of the town.——As regards the many public buildings, the new Houses of Parliament are the only ones of any importance yet in the hands of the builder. The gigantic block, the very difficult foundations of which were commenced in 1887, will probably take some six years to complete. The design, which was selected in competition, is Herr Steindl's, the style selected being Gothic. The site is a most admirable one, and as the frontage measures 265 mètres, and the height of the main cupola is 110 mètres, the block, —especially when seen from the river,—cannot fail to be a most imposing one.——The Leopold Cathedral, the façades and cupola of which can at last be said to be finished (the sculptural ornament even being *in situ*), seems to be making but slow progress, as far as inferior decoration is concerned. It is, indeed, difficult to determine if this Cathedral or the so-called Marble Cathedral at Copenhagen shows the least amount of progress annually. Both Budapest and the Danish capital might at least make some effort to complete their most prominent pieces of church architecture.

Dresden.—The so-called "International" Exhibition of Water-colours opened here is regarded as a success.——The Semper Exhibition, which will be opened here in connexion with the unveiling of the Semper monument, and the visit of the architects attending the biennial gathering at Leipsic, promises to be a very interesting one. Some four hundred sketches, which were in the hands of relatives of the deceased architect, [have] already arrived, and a large contingent is yet [expected from the various Government offices in which Semper has worked.——Among the number of interesting public buildings which the visitors from Leipsic will see is the new home of the [Royal Academy of Arts, on the Bruehlsche Embankment.

MISCELLANEOUS.

Deterioration of Water in Dirty Cisterns.—The cleansing of cisterns and water-tanks, a thing never to be safely neglected, calls for special attention at this season of the year, and Dr. W. Sedgwick Saunders, the Medical Officer of Health to the City, did well in enforcing its necessity in his last report to the Commissioners of Sewers. Too often, however, there are insuperable difficulties in the way, owing to the inaccessible position in which the cistern is placed, due to the neglect of the water companies to enforce the provisions of their own regulations—one of which, the 13th, requires that the cistern shall be placed in such a position that it may be inspected and cleansed. It is by no means uncommon to find the cistern placed under the floor of a bed-room, over a water-closet which it also supplies, or in the roof; and, when in the latter position, not seldom without a cover, contrary to the requirements of the same regulation. The companies have been remiss in carrying out what we may call the sanitary provisions of the regulations, and we may instance the 14th, which provides for the removal of waste-pipes connected with drains. For twenty years they have had the power, by serving a simple notice, to effect this sanitary improvement, but have never been induced to do it, although the necessity of the step was constantly impressed on them by the late Water Examiner, Sir Francis Bolton, and, some years ago, by the Local Government Board also. It is of little avail that they supply well-filtered water if it is allowed, as so frequently is the case, to become contaminated in filthy and neglected receptacles. The matter is one well deserving of the attention of the sanitary authorities, whose hands, we hope, will be strengthened shortly by the By-laws for the purpose which they are authorised to make under the provisions of the Public Health (London) Act, 1891.—*British Medical Journal.*

The American Output of Pig-iron in 1892.—It has been repeatedly urged by American trade papers that the present output of pig-iron in the United States is far too large for consumption, and that furnaces should be blown out. From statistics just published by the American Iron and Steel Association, it appears that there were blowing, on June 30 last, 256 furnaces, against 313 furnaces on December 31, 1891. Although the number of furnaces in blast on June 30 last was thus fifty-seven less than at the close of 1891, the smaller number produced almost as much pig-iron in the first half of 1892 as the larger number in the second half of 1891. The statistics, received direct from the manufacturers, show that the total production of pig-iron in the United States during the first six months of the current year was 4,799,056 tons, which, compared with the production of 4,911,763 tons in the second half of 1891, exhibits a decrease of only 112,707 tons. Adding together the production of the two half-years, there is the extraordinary output of 9,710,819 tons in twelve months, which is 508,116 tons in excess of the production of 9,202,703 tons in 1890, the largest ever previously recorded. The American production in the twelve months of 1891 fell below that of 1890 because of the serious interruption to furnace activity, owing to labour troubles, in the first half of 1891, when only 3,368,107 tons were made, the total output for the year being 8,279,870 tons. The result of the great furnace activity in the first six months of 1892 has been an unheard of accumulation of stocks of pig-iron, which on June 30 last amounted to 737,946 tons, the effect of which has been the great depression now prevailing in the American iron market.

Liverpool Engineering Society.—It is announced by the Hon. Secretary of this Society, with reference to the remainder of the summer excursions of the Society, that it has been decided, owing to the visit of the members of the Iron and Steel Institute to Liverpool next month, to amalgamate the intended visits of the Society to the Mersey Aqueduct Tunnel, Norton Water Tower, Liverpool Overhead Railway, and Hydraulic Power Company's Works with those of the Institute.

Smoke from Domestic Fires.—In Section G. of the British Association, a paper on "A System of Purifying the Smoke from Domestic and other Fires" was submitted by Colonel E. Dulier. This process consists in mixing the smoke as it leaves the flue with a small quantity of steam, generated in a boiler forming part of the kitchen range. The mixed steam and smoke pass into an open chamber, the top part of which is provided with a number of pipes, placed in the direction of the prevailing wind, through which the air passes and helps to cool the gases. At the extreme top of this chamber,

COMPETITION, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITION.

Nature of Work.	By whom Advertised.	Premium.	Designs to be delivered.
*Town Hall	Walsall Corp.	105*l.* 78*l.* 15s. 52*l.* 10s.	Nov. 12

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Painting Works, &c. Pier and West Wharf	Met. Asylums Board..	*Official*	Aug. 22
*Tarpaving Playground	Edmonton Union	T. E. Knightley	Aug. 23
*Two Reservoirs, &c.	Montgomery T. C.	*Official*	Aug. 24
*Service Tank, Laying Pipes, &c.	Bishop's Castle T. C.	W. Wyatt	do.
Twenty-eight Workmen's Cottages, Ystrad, Rhondda, S. Wales	Bodringallt Bldg. Club	.....	do.
*Alterations at Workhouse	Kensington Guars. ..	T. W. Aldwinckle	Aug. 25
Alterations, &c. Baptist Chapel, Gwawr, Aberaman	.....	T. Roderick	do.
Twenty-one Cottages, Tonytrefail, near Pontypridd	First Tonytrefail Bldg Society	.....	do.
Storehouse and Stables, Glossop and Grimsby	Manchester, Sheffield, & Lincs. Ry. Co.	*Official*	do.
Residence and Stabling, Moortown, near Leeds	.....	G. F. Danby	do.
*Sewerage Works ..	Walthamstow L. B. ..	G. W. Holmes	Aug. 26
Alterations, &c. Mapplewell Church, Newcastle-on-Tyne	.....	Oliver & Leeson	do.
*New School for Infants	Burton-upon-Trent School Board	R. Churchill	Aug. 30
*Creosoted Wood Paving Works	Farnham and Hartley Wintney School	Mr. Stapley	Aug. 31
*Granite Channelling and Kerbs	Sandwich Corp.	A. J. Catt	do.
*Extension of Workhouse	Barnet Union	W. H. Mansbridge	do.
*Steam and Hot Water Works	do.	do.	do.
*New Brick Bridge, &c.	Wood Green L. B.	*Official*	do.
Police Station and Court, Stamfordham, Newcastle-on-Tyne	Standing Joint Com.	J. Cresswell	Sept. 3
*Drainage Works, Willingdon	.....	G. A. Wallis	do.
*Pumping Engine Station, &c. &c.	Corp. of York	*Official*	Sept. 5
*Extension of Asylum	Poplar and Stepney Sick Asylum	A. & C. Harston	Sept. 6
*40,000 Jarrah Wood Blocks	St. George-the-Martyr Vestry, Southwark..	*Official*	do.
*Road Materials	Bromley Local Board	do.	do.

CONTRACTS.—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Works at Relief Offices	St. Mary (Islington) Guardians	W. Smith	Sept. 8
*Three Galloway Boilers, &c. &c.	South Metropolitan School District	H. Spooner	Sept. 12
*Additions, &c. to Cane Hill Asylum	Asylums Committee of London C. C.	C. H. Howell	do.
*Erection of 40 Houses, Leeds	North Eastern Ry. Co.	W. Bell	Sept. 14
*Widening Railway, Leeds and Selby Branch	do.	H. Copperthwaite	do.
*Refreshment Room, Dulwich Park	London County Council	*Official*	Sept. 27
*Lodge, Conveniences, &c. Plumstead	do.	do.	do.
*Lime Kiln, Dock, Sewer, &c. &c.	do.	do.	do.
*Steel and Iron Bridge over River Lea	do.	do.	do.
*Erection of School Buildings	Law and City Courts Com. of Corp. of City of London	do.	Oct. 3
*Three Houses, Camberwell	.....	J. Sargeant	No date.
Public Hall, Club, Library, &c. Cwmbwrla near Swansea	.....	Wilson & Mortham	do.
Wesleyan Schools, Rodley, near Leeds	.....	Walker & Collinson	do.
School Buildings, Old Trimdon, Newcastle-on-Tyne	C. R. Cwens	.....	do.
Covering Steam Boilers and Pipes	Ystrad Gas and Water Co.	*Official*	do.
School Chapel, Blaydon-on-Tyne	.....	W. L. Newcombe	do.
Schools, Teachers' Houses, &c. High Spen, co. Durham	Chopwell (Newcastle-on-Tyne) Sch. Bd.	S. Oswald & Son	do.
Extension of Co-operative Store, near Chester-le-Street	.....	do.	do.
Alterations, &c. "Fox and Hounds," Crawcrook, Newcastle-on-Tyne	.....	Oliver & Leeson	do.
House and Sculleries, Roundhay-road, Leeds	J. T. Finney	.....	do.
Warehouse, Merridon-street, Leeds	.....	Smith & Tweedale	do.
*Soldiers' Quarters, Colchester	War Department	*Official*	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Clerk of Works	Llanelly Union	2*l.*	Aug. 24
*Assistant Engineer	Borough of Bury St. Edmunds	2*l.* 10s.	Aug. 27
*Surveyor	Bromley Loc. Bd.	250*l.*	Aug. 30

Those marked with an Asterisk (*) are advertised in this Number. *Competition*, p. iv. *Contracts*, pp. iv., vi., viii., & ix. *Public Appointments*, p. xx.

just before passing into the atmosphere, the gases are met by a very fine shower of water issuing from minute holes in a pipe. The result of this treatment is a very thorough washing of the smoke, and the almost complete removal of all solid matters (soot and dust) and a large proportion of the sulphurous acid always present in coal-smoke. The removal of the soot and dust is so perfect that a piece of wet cotton held in the issuing gases remains perfectly white even after a lengthened exposure. The amount of steam required is small, and may be neglected in an estimate of the cost of working the process, as it is generated by means of heat which would not otherwise be available for any useful purpose. The only item of cost to consider is that of water. The amount used in the apparatus at Sloane-gardens is found to be about 10 gallons per hour; this includes the condensed water from the steam. This apparatus treats the smoke from a large kitchen-range burning about 20 lbs. of coal per hour, but it is capable of treating the smoke from several such fires. The draught is not sensibly impaired by the apparatus, any slight retarding of the flow of the gases being more than compensated by the action of the jet of steam. The results of a number of experiments with the apparatus at atmospheric temperatures varying from 92 deg. Fahr. (33·3 deg. C.) in the shade (part of the time the apparatus was exposed to direct sunshine) to 50 deg. Fahr. (10 deg. C.) showed that almost the whole of the soot was removed, and a considerable proportion of the sulphurous acid. The apparatus was said to be exceedingly simple to work, being, in fact, almost automatic.

CAPITAL AND LABOUR.

WAGES PAID AT THE HOMESTEAD WORKS.—There exists considerable misapprehension as to the wages paid at the Homestead Works of the Carnegie Steel Company, as well as to the causes which led to the strike and its lamentable results. According to the sworn statement made to a Congressional committee by Mr. H. C. Frick, Chairman of the Company, the wages earned during May by the men at Homestead, working only eight hours per day, were 3s. 8½d. per hour, 1*l.* 9s. 8d. per day, or 455*l.* per annum. The highest wages are made by the rollers, who earned 6s. 4d. per hour, 2*l.* 10s. 6d. per day of eight hours, or 757*l.* 10s. per annum of 300 working days; the lowest by the cranemen, who earned 2s. an hour, 16s. per day, or 240*l.* per annum. As to the cause of the strike, it appears that, owing to the introduction of the newest machinery for rolling armourplates at the Homestead Works, the workmen were able to turn out 60 per cent. more steel than with the old machinery. The Company offered to divide the saving thus effected with its workmen, as had been accepted under similar conditions at another of Messrs. Carnegie's works; but the Homestead men, acting upon the advice of their leaders, declined the offer, and foolishly struck.

LEGAL.

ARBITRATION CASE.

WE are informed that some months since Messrs. Reed, Blight, & Co. (Lim.), of Plymouth, the contractors for the erection of the Palace Hotel, Bournemouth, sent in a claim to the architects of that building, Messrs. Helyer & Munt, amounting to 7,300*l.*, for extra and omitted works up to and including the roof. After considerable delay, the architects certified that 1,026*l.* only was due in full and final settlement. Thereupon the contractors proceeded to lay the matter before Mr. Macvicar Anderson, the President of the Royal Institute of British Architects, the arbitrator named in the contract. After a patient inquiry, held at the Surveyors' Institute, Great George-street, Westminster, the arbitrator has, we hear, awarded the contractors the sum of 6,612*l.* 13s. 9d.

MEETINGS.

SATURDAY, AUGUST 20.

Architectural Association.—Annual Excursion, Taunton (concluding day).

MONDAY, AUGUST 22.

British Archæological Association.—Annual Congress, Cardiff.

TUESDAY, AUGUST 23.

British Archæological Association.—Annual Congress, Cardiff (continued).

WEDNESDAY, AUGUST 24.

British Archæological Association.—Annual Congress, Cardiff (continued).

THURSDAY, AUGUST 25.

British Archæological Association.—Annual Congress, Cardiff (continued).

FRIDAY, AUGUST 26.

British Archæological Association.—Annual Congress, Cardiff (continued).

SATURDAY, AUGUST 27.

British Archæological Association.—Annual Congress, Cardiff (concluded).

Glasgow Architectural Association.—Visit to Dunblane Cathedral.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

15,347.—SANITARY DWELLINGS: *W. Van der Heyden.*—The primary object of this invention is the construction of houses which will enable people to live in the coldest climates and in the hottest countries, being at the same time perfectly hygienical. The mode of carrying this out can only be adequately understood by reference to the very detailed specification and drawings.

15,509.—ARTIFICIAL STONE: *G. Dolenz.*—In carrying out this invention, the inventor employs for the production of plain or uncoloured artificial stone from 4 to 5 parts of finely-ground burnt magnesite, 2 to 3 parts clean, washed crystal sand, and 4 to 5 parts 34 per cent chloride of magnesium-lye. These ingredients are intimately mixed together to form a pasty mass, which may either be spread out to the desired thickness on a glass table, or poured, whilst stirred, into a suitable mould previously washed with chloride of magnesium-lye. It is then placed in a chamber to be dried by exposure to a constant temperature of 80 deg. R., during about twenty hours. When it is desired to produce veined stone or marble, a mixture of the above is made, which is coloured with an earth colour corresponding to the kind of stone or marble to be imitated. This coloured mixture is added to that first described, and the two are stirred together, preferably by means of a round wood bar. In order to obtain a beautiful veiny appearance, the uncoloured mixture is made thinner than the coloured mixture. In this way the latter is distributed in a threadlike or vein form in the thinner substance. The coloured composition is then treated in the manner described for the uncoloured stone or marble.

6,940.—WALLS AND PARTITIONS: *G. Hayes.*—This invention relates to improvements in the construction of walls and partitions for buildings, and consists of different combinations of corrugated sheet metal as a foundation, with metallic lathing as a facing secured to the foundation, and upon which plaster may be applied and securely held.

7,941.—STONE-CUTTING: *P. C. Gerard.*—This invention relates to the cutting or sawing of all kinds of stone, granite, marble, and other like hard substances, and particularly to that class of machines in which the cutting operation is effected by means of diamonds set into bits on diamond holders, which are attached to an endless blade passing over two pullies. The improvements mainly consist of a machine comprising various

devices in mechanism for imparting rotary motion to the blade-carrying pullies, for imparting an upward or downward motion to the endless blade and its carrying pullies, for tightening the endless blade around its pullies, and thereby ascertaining the degree of tension which is required to be put on the blade, and lastly, for hoisting the driving shaft carrying one of the blade-pullies, so as to enable the blade to be passed under the said shaft when it is required to be inserted in its proper place in the machine. There are also improved means for securing or fixing the diamond-holders into the metal blades used in the machine.

10,196.—ARTIFICIAL WOOD: *P. A. H. Wehner.*—This invention relates to the manufacture of artificial wood, and comprises the employment of a mixture composed chiefly of burnt magnesite. The other ingredients of the mixture may be any suitable vegetable waste matters, such as wood in the form of shavings, chips, sawdust or cellulose, peat, turf, jute, flax, cotton, &c.; or animal waste, as hair, wool, &c., may be employed. Such waste material is first converted into a pulp by means of a liquid consisting of muriatic acid saturated with ground or pulverised magnesite. Instead of such liquid, a direct solution of chloride of magnesium may be used. The hardness of the product, or artificial wood, which is subsequently produced will mainly depend upon the graduation of this solution. This pulp is converted into a plastic mass by mixing the pulp with burnt magnesite, previously properly reduced to a powdery state. A thoroughly homogeneous mass is thus formed, which may be moulded or formed as in moulding sand. This mass may now be placed in proper moulds, with or without the employment of pressure, so as to form the articles to be produced, such as slabs, stones, flags, &c. As an essential requirement in producing the artificial wood or rough articles made of it, it is necessary to treat them by lixiviation.

NEW APPLICATIONS FOR LETTERS PATENT.

August 2.—13,946, M. Syer, Syphon Flushing Tank.—13,947, C. Openshaw and R. Wood, Ventilating Brick for Building in Brick or other Walls, to carry Joists or other Wall Timbers, to Prevent Rot.

August 3.—14,018, D. Taylor, the "Pascoe" Closet for Prevention of Stench from Pit Closets, where Water-closets are not convenient.—14,053, E. Ulrichs, White Colouring Matter or Paint.—14,055, H Siegert and G. Taubert, Ventilating Apparatus for Working Rooms, Cellars, &c.

August 4.—14,062, R. Wilding, Washing out Water-closets and the Flushing of the same.—14,069, P. Morris and J. Spencer, the "Equipoise" System of Sash Window Opening.—14,085, F. Hubber, Baths, and Cisterns therefor.

August 5.—14,132, W. Bramley, Detachable Handles for Saws.—14,140. L. Hull, Cocks for Water-pipes.—14,151, M. Piper, Domestic Hearths or Fire-places.

August 6.—14,218, W. Dick, Gas-pipes.—14,225, J. Bennett, Glazing Nail.—14,226, G. Martin, Glazing Roofs and Skylights.—14,231, J. Wall and J. Ross, Ladders.—14,238, S. Challen, Sash-windows.—14,243, J. Rhodes, Apparatus for raising Building and other materials.—14,260, J. Keene, Door-checks.

PROVISIONAL SPECIFICATIONS ACCEPTED.

9,853, L. Lecellier, Automatically released Latch or Bolt for Locks.—10,651, H. Sully, Ceiling Roses for use with Pendant Electric-light Fittings.—11,227, L. Brame and C. Hackett, Combination Screw-nail.—11,520, C. Procopides, Gas Chandeliers, &c.—11,703, H. Newton, Automatically Opening or Closing the Doors leading to Lifts or Elevators, Openings or Shafts.—12,854, J. Parker, Wood Mantels.—12,912, J. Brown, Chimney-top.—12,946, S. and J. Heal, Chimney-cowls.—13,175, S. Hill, Window-fastenings.—13,416, H. Doulton and R. Heldrum, Glazing Pottery.—13,462, W. and E. Freeman, Window-sashes.—13,478, J. Jameson, Hanging Window-sashes.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

13,484, G. Peters and S. de Lucchi, Compound Fire-grates.—16,692, J. Davies, Bricks, Tiles, Blocks, Roofing Materials, and other such like articles and compositions.—17,006, J. Lange, Landing Bricks, &c.—8,883, F. Gibbons, Sash Lifts and Fasteners.—10,801, S. Groff, Nails and Screws.—12,215, O. Stifft, Brick-kilns.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

AUGUST 6.—By *Debenham, Tewson, & Co.* (at Newcastle): Two f. houses, near Newcastle, with a granary, &c., 735*l.*

AUGUST 8.—By *Driver & Co.*: 1, 2, and 3, King's-rd., Fulham, f., area 8,850 ft., 900*l.*; "Elysium Cottage," in the rear, f., 200*l.*; 25 and 27, Sedgmoor-pl., Camberwell, f., r. 44*l.*, 690*l.*—By *Humbert Son, & Flint*: 65, Font-hill-rd., Finsbury, f., with off-licence, 1,050*l.*; 28 to 34 (even), Ponsard-rd., Willesden, u.t. 87 yrs., g.r. 23*l.*, r. 106*l.* 12*s.*, 320*l.*

AUGUST 9.—By *J. G. Ponder*: The lease of 144, Fulham-rd., u.t. 24 yrs., 975*l.*—By *G. Head & Co.*: 117, 119, and 121, Drummond-st., Euston-sq., u.t. 27 yrs., g.r. 49*l.*, r. 122*l.*, 350*l.*; 90, Hampstead-rd., u.t. 16 yrs., g.r. 35*l.* 8*s.*, r. 55*l.*, 106*l.*; 7 and 8, Grove-rd., u.t. 19½ yrs., g.r. 48*l.* 7*s.*, 200*l.*—By *Belton & Sons*: 2 and 3, Bedford-st., Strand, f.g.r. of 550*l.* a year (sold before auction).—By *Deverell & Co.*: 26, Harold-rd., Hornsey, u.t. 90 yrs., g.r. 6*l.* 6*s.*, r. 36*l.*, 330*l.*; 13, Greyhound-rd., Fulham, u.t. 86 yrs., g.r. 8*l.*, 240*l.*—By *A. Robertson*: 22, Hadley-st., Kentish Town, u.t. 68 yrs., g.r. 4*l.* 4*s.*, r. 30*l.*, 260*l.*—By *C. & H. White*: 41 and 43*a*, Denmark Hill, f. and l., r. 120*l.*, 1,620*l.*; 6, 7, and 8, Paris-st., Lambeth, u.t. 17 yrs., g.r. 21*l.*, r. 105*l.*, 600*l.*; 8, Little Paris-st., u.t. 6½ yrs., g.r. 6*l.*, r. 29*l.*, 70*l.*;

AUGUST 10.—By *Furber, Price, & Furber*: Myddelton-rd., Wood Green, f.g.r. of 94*l.* 10*s.*, reversion in 89 yrs., 1,850*l.*; Western-road, f.g.r. of 36*l.* 15*s.*, reversion in 89 yrs., 700*l.*; 115, Westbourne-ter., Hyde Park, u.t. 45 yrs., g.r. , 1,800*l.*; By *Robson & Perrin*: 34, 36, and 38, Lulot-st., Highgate, u.t. 87 yrs., g.r. 15*l.*, 375*l.*; 63, Duncombe-rd., Holloway, u.t. 67 yrs., g.r. 6*l.*, 200*l.*; 49 and 51, Mulkern-rd., u.t. 67 yrs., g.r. 10*l.*, r. 64*l.*, 400*l.*

—By *Norton, Trist, & Gilbert*: Appleford-rd., North Kensington; f.g.r. of 107*l.*, reversion in 73 yrs., 2,585*l.*; f.g.r. of 15*l.*, reversion in 73 yrs., 360*l.* — By *Rutley, Son, & Vine*: 11, Rutland-st., Hampstead-rd., u.t. 45 yrs., g.r. 5*l.*, r. 63*l.*, 700*l* By *W. Wingham*: 1 to 4, Ingoldisthorpe-grove, Old Kent-rd., u.t. 72 yrs., g.r. 14*l*, 730*l.* By *H. C. Newson* (at Petersfield): cottages and enclosures of land, Liss, Hants, containing 116*a.* 0*r.* 12*p.*, 5,450*l.*, f.g.r. of 60*l.*, reversion in 92 yrs., 1,275; f.g.r. of 2*l.* 10*s.*, reversion in 82 yrs., 75*l.*; "Mabbotts Farm," Hawkley, Hants, containing 25*a.* 0*r.* 38*p.*, f., 1,100*l.*

AUGUST 11.—By *Geo. Pearce & Sons*: 5 and 15, Shaftesbury-st., Hoxton, u.t. 6 yrs., g.r. 5*l.* 10*s.*, 147*l.*; 47, Gopsall-st., u.t. 45 yrs., g.r. 5*l.* 10*s.*, 310*l.*—By *Newbon & Co.*: 55 to 61 (odd), Felbrigg-st., Bethnal Green, f., r. 83*l.* 4*s.*, 790*l.*; 4, 7, and 8, Railway-st., King's Cross, u.t. 52 yrs., g.r. 15*l.*, 605*l.*; 3, Havergal-villas, Tottenham, u.t. 91 yrs., g.r. 7*l.* 10*s.*, r. 36*l.*, 405*l.*; 14, Alwyne-rd., Canonbury, u.t. 52 yrs., g.r. 13*l.*, r. 60*l.*, 405*l.*—By *Stimson & Sons*: 2, Alderville-rd., Fulham, f., 350*l.*; 6, Abercrombie-st., Battersea, u.t. 80 yrs., g.r. 4*l.*, 240*l.*; 79 and 81, Camilla-rd., Bermondsey, u.t. 46 yrs, g.r. 8*l.*, 460*l.*; 3, Ernest-st., u.t. 25 yrs., g.r. 6*l.* 6*s.*, 125*l.*; Burrage-rd., Plumstead, i.g.r. of 54*l.*, u.t. 16½ yrs., g.r. 6*l*, 315*l.*—By *Debenham, Tewson, & Co.* (at Cheltenham): F. building land, Cheltenham, 3*a.* 1*r.* 26*p.*, 600*l.*—By *Wilkinson, Son, & Welch* (at Brighton): 21, 22,, and 24, London-st., Brighton, f., r. 62*l.*, 820*l.*—By *Martin Vigers*: High-st., Eltham, f. house and buildings, 450*l.*—By *Cooper & Goulding*: Myddleton-st., Clerkenwell, l.g.r. of 111*l.* 11*s.*, u.t. 19 yrs., r. 21*l.*, 925*l.*; 6, Nunhead-cres., Peckham, u.t. 12 yrs., g.r. 13*l.*, r. 48*l.*, 170*l.*; 115, Upland-rd., Dulwich, u.t. 87 yrs., g.r. 6*l.* 10*s* , r. 28*l.*, 260*l.*

AUGUST 12.—By *A. & A. Field*: 50, Rutland-st., Mile End, u.t. 14 yrs., g.r. 2*l.* 2*s.*, r. 27*l.* 6*s.*, 95*l.*; 21, Rutland-st., u.t. 14 yrs., g.r. 2*l*, r. 39*l.*, 135*l.*; 4, Mount-pl., Whitechapel, u.t. 9 yrs., g.r. 30*l.*, 105*l.*; 3, 5, and 7, East-st., Barking, and 1 to 8, Morgan's-ct., c., 650*l.*; residence, "Fawley House," f., 1,520*l.*; 9, Statham-grove, Stoke Newington, u.t. 82 yrs., g.r. 7*l.*, r. 32*l*, 295*l.*; 121, Portland-rd., Notting-hill, u.t. 47 yrs., g.r. 8*l.* 8*s.*, r. 30*l.*, 200*l.*

[*Contractions used in these lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold: l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G. ton	9/0/0	0/0/0
Teak, E.I... load	9/10/0	15/0/0
Sequoia, U.S.ft.cu.	2/4	3/0
Ash, Canada load	3/10/0	4/0/0
Birch, do.	3/5/0	4/10/0
Elm, do.	3/10/0	4/15/0
Fir, Dantzic, &c.	1/10/0	3/10/0
Oak, do.	3/0/0	5/5/0
Canada.....	5/10/0	7/0/0
Pine, Canada red	2/10/0	3/10/0
Do, yellow	2/10/0	5/0/0
Lath, D'ntzic, fath	5/0/0	6/0/0
St. Petersburg	5/0/0	7/0/0
Deals, Finland		
2nd & 1st std 100	7/10/0	9/10 0
Do, 4th & 3rd..	7/0/0	8/0/0
Do. Riga	6/10/0	8/0/0
St. Petersburg, 1st yellow ..	10/10/0	14/10/0
Do. 2nd yellow	8/0/0	9/10/0
Do. white	7/10/0	10/0/0
Swedish	7/0/0	15/10/0
White Sea	8/0/0	17/0/0
Canada, Pine 1st	20/0/0	36/0/0
Do. do. 2nd....	14/10/0	16/0/0
Do. do. 3rd, &c.	8/0/0	10/0/0
Do. Spruce. 1st	8/10/0	11/0 0
Do. do. 3rd & 2nd.....	6/15,0	8/0/0
New Brunswick	7/0/0	7/10/0
Battens, all kinds	3/10/0	15/10/0
Flooring Boards, sq., 1 in. prep. 1st	0 3/0	0/13 6
Do. 2nd.....	0/7/0	0/10,6
Other qualities	0/3'6	0/8.0
Cedar, Cuba ..ft.	/3½	/4½
Honduras, &c.	/3½	/4
Mahogany, Cuba.	/4½	/6½
St. Domingo, cargo av	/4½	2/0
Mexican do. do	/4	/5
Tobacco do. do	/5½	/7
Honduras do..	/5½	/6½
Box, Turkey ton	4/0/0	13/0/0
Rose, Rio.....	10/0/0	20/0/0
Bahia	8/0/0	12/0 0
Satin, St. Domingo ...ft.	0 0/3	0/1/3
Porto Rico	0/0/3	0/1/6

TIMBER (*continued*).		
Walnut, Italian..	0/0/3½	0/0/7
METALS.		
IRON—Pig, in Scotland .....ton	2/1/10½	0/0/0
Bar, Welsh, in London.....	5/17/6	6/0/0
Do. do. at works in Wales	5/7/6	5/10/0
Do. Staffordshire, in London	6/5/6	6/15/6
COPPER—British, cake and ingot	47/10/0	48.0/0
Best selected ..	48/10/0	49.0/0
Sheets, strong..	56/0/0	0/0/0
Chili, bars	44/6 3	44/13/7
YELLOW METAL lb.	0/0/4½	0/0/5½
LEAD—Pig, Spanish....ton	10/6/3	10/7/6
English, com. brands	10/10/0	10/12'6
Sheet, English, 3 lbs. per sq. ft. and upwards ..	12/0/0	0/0/0
Pipe	12/10/0	0/0/0
ZINC—English sheet .....ton	25/0/0	25 10/0
Vieille Montagne.....	26/5/0	0/0/0
TIN—Straits	93/15/0	94 5/0
Australian	94 5/6	94 15/0
English Ingots.	97/0/6	97/10/0
Banca	95/0/0	0/0/0
Billiton	94/10/0	0/0/0
OILS.		
Linseed .....ton	18/2/6	18/7/6
Cocoanut, Cochin	24/15/0	25/0/0
Do. Ceylon	21/15/0	0/0 0
Palm, Lagos	22/5/0	22/10/0
Rapeseed, English pale	24/10/0	25/0/0
Do. brown	23/0/0	0/0/0
Cottonseed ref....	19/0/0	0/0/0
Oleine	20/10/0	21/0/0
Lubricating, U.S.	4/0/0	5/0/0
Do. refined	5/10/0	12/0/0
TAR—Stockholm barrel	0/19/0	0/0/0
Archangel	0/12/6	0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 12 *noon on Thursdays.*]

BROMLEY (Kent).—For alterations and additions to 10 and 11, Bromley-common, Kent, for Mr. Christopher Turner. Messrs. Bushell & Crosier, architects, 22, Great James-street, Bedford-row, W.C.:—

Graham	£829 10	Taylor & Son, Bromley*..	£686 10
Draper	753 10	Roper	489 0

* Accepted with modifications.

CROYDON.—For the erection of one pair of semi-detached villas, Brighton-road, Croydon, for Mr. G. Dutfield. Mr. James Butterworth, architect, Felixtowe. Quantities by the architect:—

Outhwaite	£1,767	Parker	£1,450
Castle	1,494	M. Taylor, Croydon*	1,428

*Accepted.

CROYDON.—For the erection of forage stores, East Croydon, for Messrs. Rickett, Smith & Co., Ltd. Mr. G. Allan, architect:—

A Deacon & Co.....	£465	M. Taylor (accepted).....	£454

CROYDON.—For the erection of corn stores, at Croydon, for Messrs. Henry Yates & Co. Mr. F. West, architect, Croydon:—

Bristy & Co.	£337 0	Anderson.....	£318 0
Hanscomb & Smith	336 0	M. Taylor, (accepted)....	307 10
Bulled & Co.	329 0	Saunders.....	307 0

CROYDON.—For building six shops and premises at George-street, Croydon. Mr. G. Warren Cooper, Bedford-row House, Bedford-row, W.C., architect. Quantities supplied:—

Longby & Co.	£7,775	A. Bullock.....	£6,535
P. Peters	7,300	Bulled & Co.....	6 379
W. Jelly.....	7.221	Wallis & Sons	6,280
M. Taylor	7,100	E. J. Saunders, Croydon*	6,200
E. Triggs	6,700	* Accepted.	
Mid Kent Building and Contracting Works	6,687		

EDMONTON.—For sanitary works at the Edmonton Union, for the Guardians. Mr. T. E. Knightley, architect, 106, Cannon-street, E.C.:—

G. L. Wilson & Co.	£1,132	Henry Knight & Son,	
Richards	1,040	Tottenham (accepted) ..	£994

LINCOLN.—For the erection of high-class Girls' School, Lindum-road, Greestone Stairs. Mr. Wm. Watkins, architect and surveyor:—

	Complete.	Alternative.
M. Otter & Co.	£5,440	£4,080
Raines	5,300	3,900
Hensman	5.275	3.975
H. S. & Wm. Close	5,252	3,840
Wm. Wright & Sons	5.120	3,727
Pattinson Bros., Ruskington.....	4.300	3,610*

* Accepted, subject to the approval of the Charity Commissioners.

LONDON.—For repairs and painting at the Paddington Infirmary, for the Guardians of the Poor. Messrs. A. & C. Harston, architects:—

Stokes & Co.	£1,317 0 0	Hillier & Edge.....	£663 10 0
Jenner.....	753 0 0	Prout	630 0 0
Batchelor	687 15 0	G. Foxley, King-street, W.*	572 12 6
Matthews Bros.....	670 0 0		

* Accepted.

LONDON.—For painting, repairs, &c., at the Workhouse, Raine-street, Old Gravel-lane, E., for the Guardians of St. George's-in-the-East. Messrs. Wilson, Son, & Aldwinckle, architects. Quantities supplied:—

Holland	£899	Derby.....	£802
Simms	879	White	787
Geo. Todd.....	862	Geo. Barker*	785
Staines	851	* Accepted.	

LONDON.—For erecting Wesleyan Chapel and School at Mill Hill, N. Messrs. Isitt & Adkin, architects:—

J. W. Woodhall.....	£1.764 2	Wm. Tout	£1,095 0
Chessum & Son	1,386 0	Godson & Sons	1,073 0
W. Crewe.....	1,340 0	J. Inwood	1,073 0
Windebank & Co.....	1,180 0	Sharpe & Son.....	1,035 0
Houghton & Son	1,162 0	H. M. Dove.....	1.069 0
J. Otway	1,139 0	Martin & Co., Croydon*	1,023 0
		* Accepted.	

LONDON.—For cleansing, painting, &c., certain wards at the Infirmary, High-street, Homerton, N.E., for the Guardians of the Hackney Union. Mr. W. A. Finch, architect, 76, Finsbury-pavement, E.C.:—

Batchelor	£1,350	Porter.....	£697
Lewis	962	Mills	650
Barker	782	G. Flaxman, Islington*	624
		* Accepted.	

LONDON.—For alterations to premises for Messrs. West & Co., Limited, Devons-road, Bromley-by-Bow, E. Mr. Charles Brown, surveyor:—

J. K. Coleman.....	£274	T. White & Son	£273
J. Holland.....	273	Sheffield Bros.....	248

LONDON.—For alterations at No. 23, Budge-row, E.C., for Messrs. English & Son, Messrs. J. Chamers & Son, architects, College-hill, E.C.:—

J. Greenwood.....	£685 0	W. H. Smith.....	£597 16
Grover & Son	655 0	Snewin Bros. & Co.,	
Hall, Beddall, & Co.	650 0	Upper Clapton*	594 0
Lawrence & Son	650 0	* Accepted.	

LONDON.—Accepted for the erection of steam-boiler, steam-mains, and heating apparatus and hot-water supplies, for the Guardians of Lambeth, at their Infirmary, Brook-street, Lambeth. Mr. T. W. Aldwinckle, architect, 1, Victoria-street, S.W.:—

Z. D. Berry & Sons, Westminster £6,300 0 0

LONDON.—For the erection of new Parish-hall and Library, for the Trustees of the St. Mary-le-Strand Freehold Estate Charity, in Drury-lane, W.C. Mr. Albert Vicars, architect, Somerset-chambers, 151, Strand, W.C.:—

	General Contract.	Supplemental Estimates.	Total.
Grover & Son	£4,970 0 0	.. £260 0 0 ..	£5,230 0 0
Patman & Fotheringham	4,760 0 0	.. 225 0 0 ..	4,985 0 0
Charteris	4,450 0 0	.. 198 0 0 ..	4,648 0 0
Shillitoe	4,440 0 0	.. 222 0 0 ..	4,662 0 0
Dove Bros.	4,395 0 0	.. 215 0 0 ..	4,610 0 0
Heath.....	4,220 0 0	.. 142 11 0 ..	4,362 11 0
Ashby Bros.....	4,219 0 0	.. 238 0 0 ..	4,457 0 0
Adamson & Sons	4,098 0 0	.. 225 0 0 ..	4,323 0 0
Pattinson	4,080 0 0	.. 240 0 0 ..	4,320 0 0
Macey & Sons	4,075 0 0	.. 204 0 0 ..	4,279 0 0

LONDON.—For the erection of fire station in Trafalgar-square, Brompton, for the London County Council. Mr. Thos. Blashill, Architect:—

S. Belham & Co. ..	£10,055 9 6	Stimpson & Co.	£8 300 0 0
Reed, Blight, & Co.	9,800 0 0	Foster & Dicksee....	8,249 0 0
W. Brass & Co.	8,393 0 0	Scharien & Co.*	7,862 0 0
		* Accepted.	

LONDON.—For alterations at 58, Westbourne-terrace, Hyde Park:—

F. Foxley & Co.	£1,458 10	H. R. Anderson, 25,	
C. Bowdon	1,264 0	Chilworth-st., W.* ..	£1,026 16
		* Accepted.	

LONDON.—Accepted for warming Holy Trinity Church, Marylebone, W. Mr. Melvyn Macartney, architect, 52*a*, Berkeley-square:—

John Grundy..... £230 0 0

LONDON.—For the erection of huts, nurses'-room, &c., at the Northern Hospital, Winchmore-hill. Messrs. Pennington & Bridgen, architects:—

Todd	£9,415	Kirk & Randall	£7,486
Leslie	8 297	H. Wall & Co., Kentish	
Brass & Son	7,910	Town*.....	7,379
Shurmur	7,544	* Accepted.	

LONDON.—For the erection of warehouses in Buck's-row, Whitechapel, E., for Messrs. S. Schneiders & Son. Messrs. Wigg, Oliver, & Hudson, architects, 7, Bedford-row, and 80, Leman-street, E. Quantities by Messrs. Franklin & Andrews :—

Hearle & Farrow	£17,299	J. Sparks	£14,875
T. Little	17,210	Perry & Co.	14,700
G. H. & A. Bywaters	16,600	Harris & Wardrop	14,597
Battley	16,379	J. Brown, Son, & Blomfield	14,500
E. Laurence & Sons	15,922	J. Bentley	14,460
Holloway Bros.	15,776	W. Brass & Son	14,444
J. Mowlem & Co.	15,637	W. Scrivener & Co.	14,389
W. Scrivener & Co.	15,138	J. O. Richardson	14,389
M. Patrick & Son	15,092	Garlick & Horton (Limited)	14,300
W. Gladding	14,972		

LONDON.—For the erection of a block of schools to accommodate 1,570 children, including caretaker, house, and cookery room, and enclosing and tar paving playgrounds, Hermit-road, Canning-town, E., for the West Ham School Board. Messrs. J. T. Newman & Jacques, Architects, 2, Fen-court, E.C. Quantities by Messrs. R. L. Curtis & Son :—

G. Sharpe	£19,250	G. & G. C. Goodchild	£17,667
J. Morter	18,762	Gregar & Son	17,634
J. Catley	18,540	W. J. Maddison*	16,867
Hearle & Farrow	18,448		

* Accepted subject to approval by the Education Department.

LONDON.—For the erection of a block of stables, store, and slaughter-house, situate in Maryland-road, Stratford New Town, E., for the Stratford Co-operative and Industrial Society, Limited. Messrs. J. T. Newman & Jacques, architects, of 2, Fen-court, E.C. Quantities by Mr. R. L. Curtis & Sons :—

J. Catley	£5,780	Co-operative Builders	£5,112
J. Morter	5,538	G. Sharpe (accepted)	5,000
W. J. Maddison	5,370	Hearle & Farrow	4 998
Gregar & Son	5,353	Castle & Co.	4,962

Ironwork.

Durham & Co.	£1,470 0	Walter Jones*	£1,255 3
Lindsay	1,465 0		

* Accepted.

LONDON.—Accepted for the erection of huts at the North-Western Hospital, Haverstock-hill. Messrs. Pennington & Bridgen, architects :—

H. Wall & Co., Carlton Works, Kentish Town .. £3,489 0 0

LONDON.—Accepted for the supply and erection of the constructional ironwork for the Meredith's Wharf Depot of the City of London Electric Lighting Company, Limited. Major-General Webber, C.B., and Colonel Seddon, Engineers :—

Peirson & Co., Fenchurch-street £2,896 0 0

LONDON.—Accepted for various repairs, &c., to premises Nos. 1, 2, and 3, Curlew-street, Horselydown. Mr. Lawton R. Ford, Surveyor, St. Thomas' Chambers, London Bridge, S.E. :—

Wm. Preston £205 0 0

LONDON.—For rebuilding premises, Nos. 20 and 22, St George's-road, Southwark, for Messrs. D. Paull & Son. Mr. Lawton R. Ford, architect, St. Thomas' Chambers, London Bridge, S.E. :—

A. Peacock	£1,894	A. White & Co.	£1,539
W. F. Russell	1,589	Canning & Mullins	1,470
H. J. Williams	1,587	Wm. Downs	1,424
W. Johnson & Co., Limitd.	1,575	R. G. Battley*	1,420
J. Bullers	1,550		

* Accepted.

LONDON.—Accepted for sundry works in extending the Bayswater Jewish mixed schools. Messrs. N. S. Joseph & Smithem, architects, 45, Finsbury-pavement, E.C. :—

S. Barnett £950 0 0

LONDON.—For decorative work at No. 21, Pembridge-villas, Bayswater. Messrs. N. S. Joseph & Smithem, architects, 45, Finsbury-pavement, E.C. :—

J. Dagnall	£299 13	H. Hanks*	£213 0
S. Barnett	285 0		

* Accepted.

LONDON.—Accepted for sundry structural works at 15, Hyde Park-square, W. Messrs. N. S. Joseph & Smithem, architects, 45, Finsbury-pavement, E.C. :—

Vare Bros. £247 0 0

NORTHAMPTON.—For erecting villa residence, Dallington Park, Northampton, for Mr. A. J. Cooper. Mr. Samuel J. Newman, architect, Northampton :—

E. Archer ..... £956 | Green Bros. (accepted) £926

ST. HELENS (Lancashire).—For the erection of boat-house, &c., at Carr Mill Dam, near St. Helens, for Colonel Gamble, C.B. Mr. W. Wallace Gandy, architect, St. Helens :—

R. H. Davies	£450	S. Beckett*	£415
W. Harrison	435		

* Accepted.

[All of St. Helens.]

ST. LEONARDS-ON-SEA.—For the erection of three houses and shops in the Norman-road, St. Leonards-on-Sea. Messrs. Elworthy & Son, architects. Quantities supplied :—

D. H. Snow	£3,004	Eldridge & Cruttenden	£2,921
C. Hughes	2,996	J. Lester	2,900
T. Salter	2,954	H. E. Cruttenden	2,889
Taylor Bros.	2,950	P. Jenkins	2,866
Moon & Garner	2,950	W. Morgan*	2,849
A. H. White	2,945		

* Accepted.

[Architect's estimate, £2,875.]

TOTTENHAM.—For alterations and additions at Nos. 383 and 385, High-road, Tottenham. Mr. John E. Pinder, architect, Bridge House, South Tottenham :—

F. Voller	£215 0	J. C. Colman	£169 10
A. Monk	203 0	Hy. Knight & Son*	166 0

* Accepted.

WAKEFIELD.—For the erection of two houses and shop at Robin Hood, near Wakefield, for Mr. D. Hartley. Mr. T. A. Buttery, architect, Queen-street, Morley :—

Masons.—Bullock, West Ardsley	£429 15 5
Joiners.—Holroyd, Morley	248 10 0
Plasterer.—Hesling, Wakefield	46 0 0
Slater.—Sharp & Harper, Leeds	32 10 0

WALTHAMSTOW.—For the erection of a detached house in the Upper Walthamstow-road, Wood-street, for Mr. J. E. Watts. Mr. W. A. Finch, architect, 76, Finsbury-pavement, E.C. :—

J. H. Mollett	£1,618	Godfrey & Son	£1,370
J. Holland	1,538	G. W. Beale	1,269
Thomerson & Son	1,492	A. Porter, Tottenham*	1,197

* Amended and accepted at £1,000.

WOOD GREEN (Middlesex).—For alterations at the "Prince of Wales" Hotel, Bounds Green-road. Mr. John E. Pinder, architect, Bridge House, South Tottenham :—

Fk. Sage	£275	F. Voller	£248
Yardley & Son	269	W. H. Laselles & Co.*	247

* Accepted.

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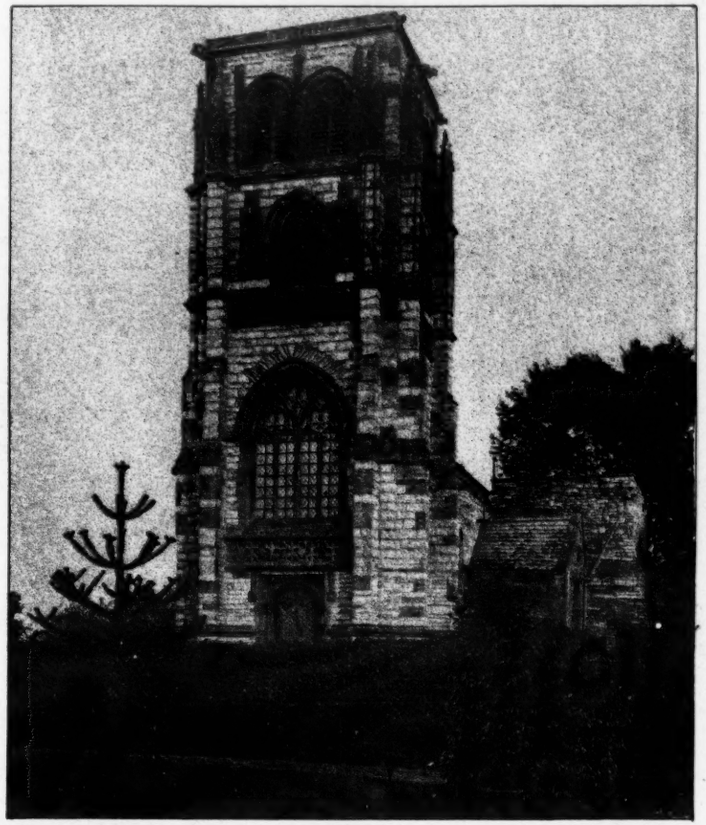

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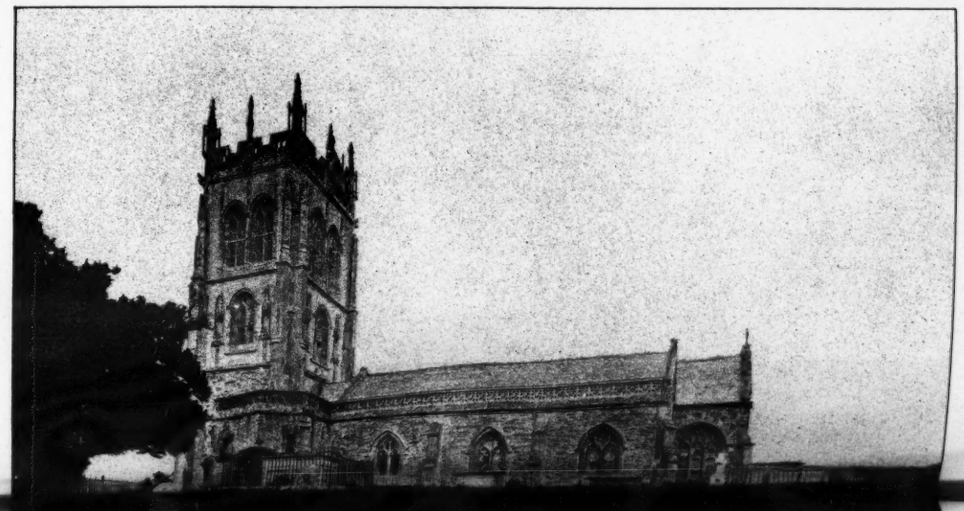

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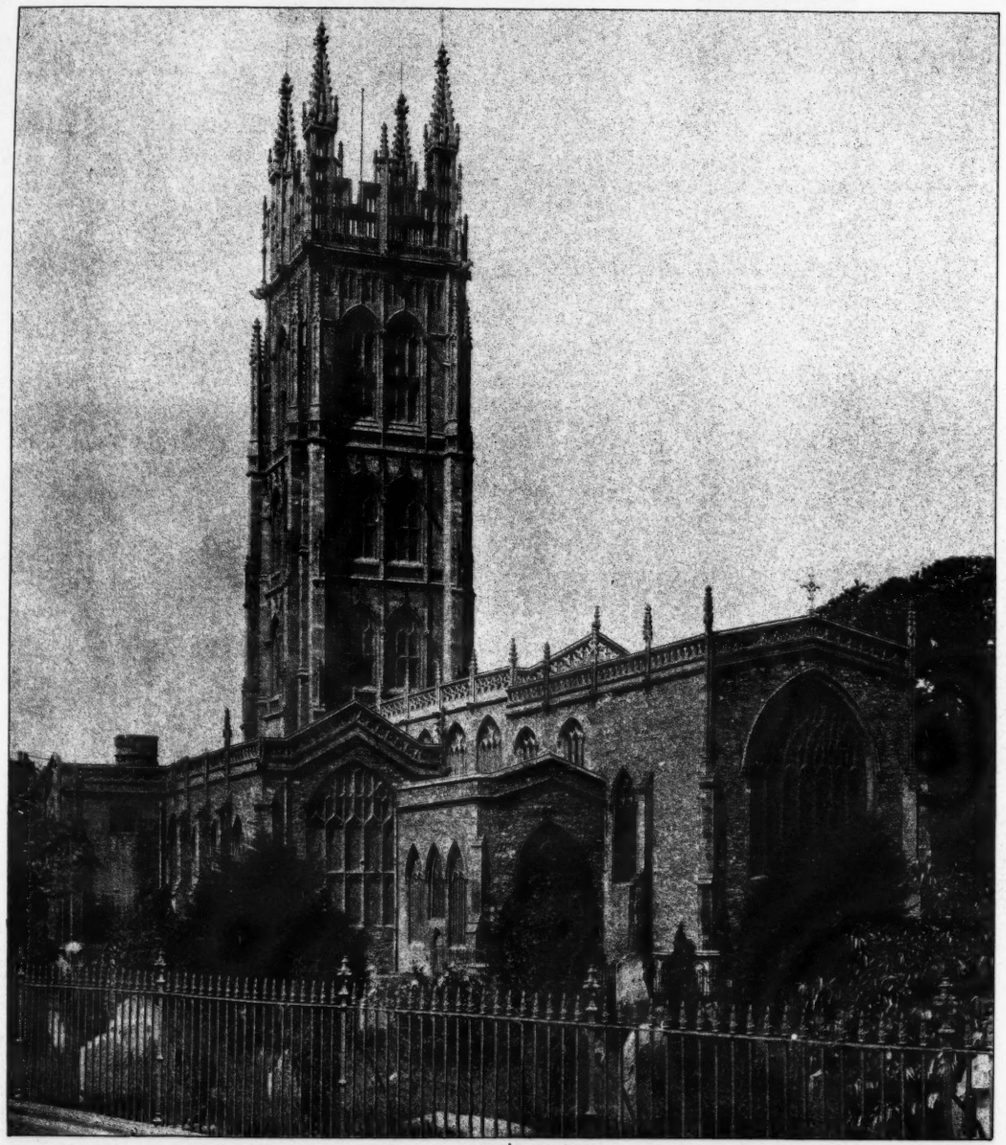

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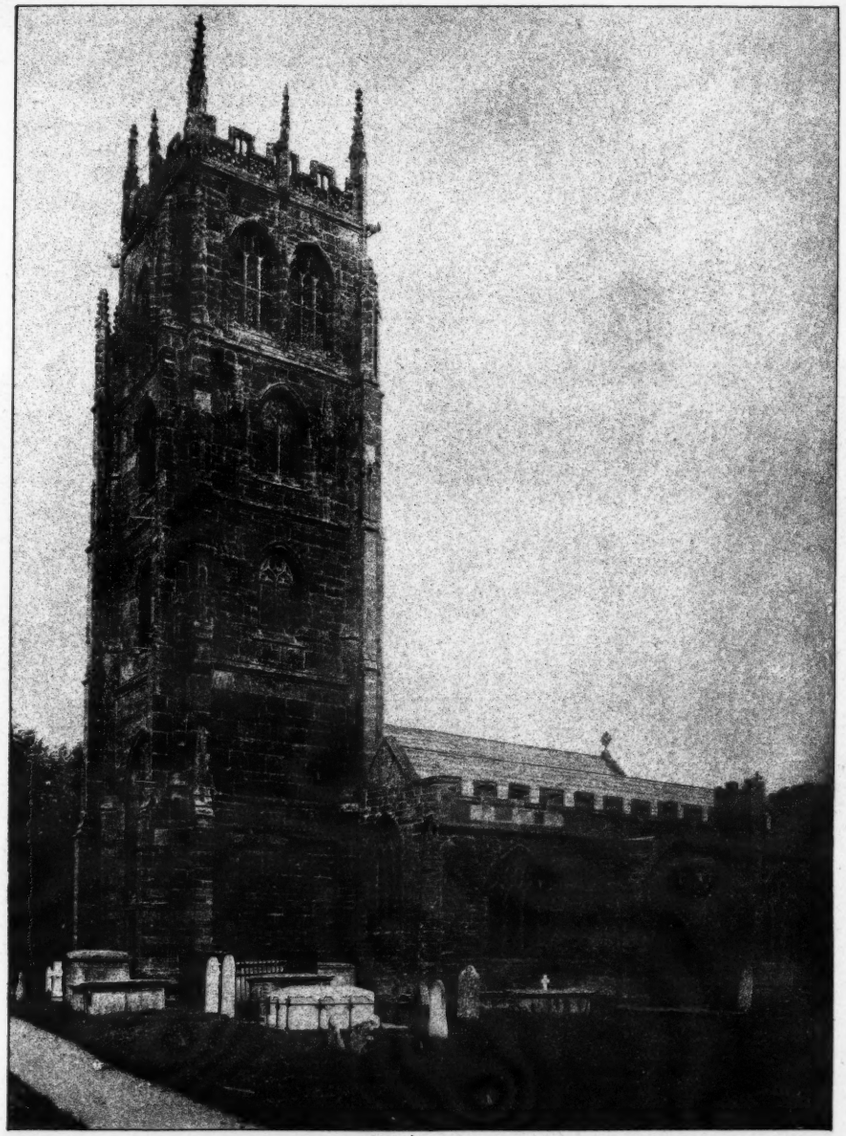

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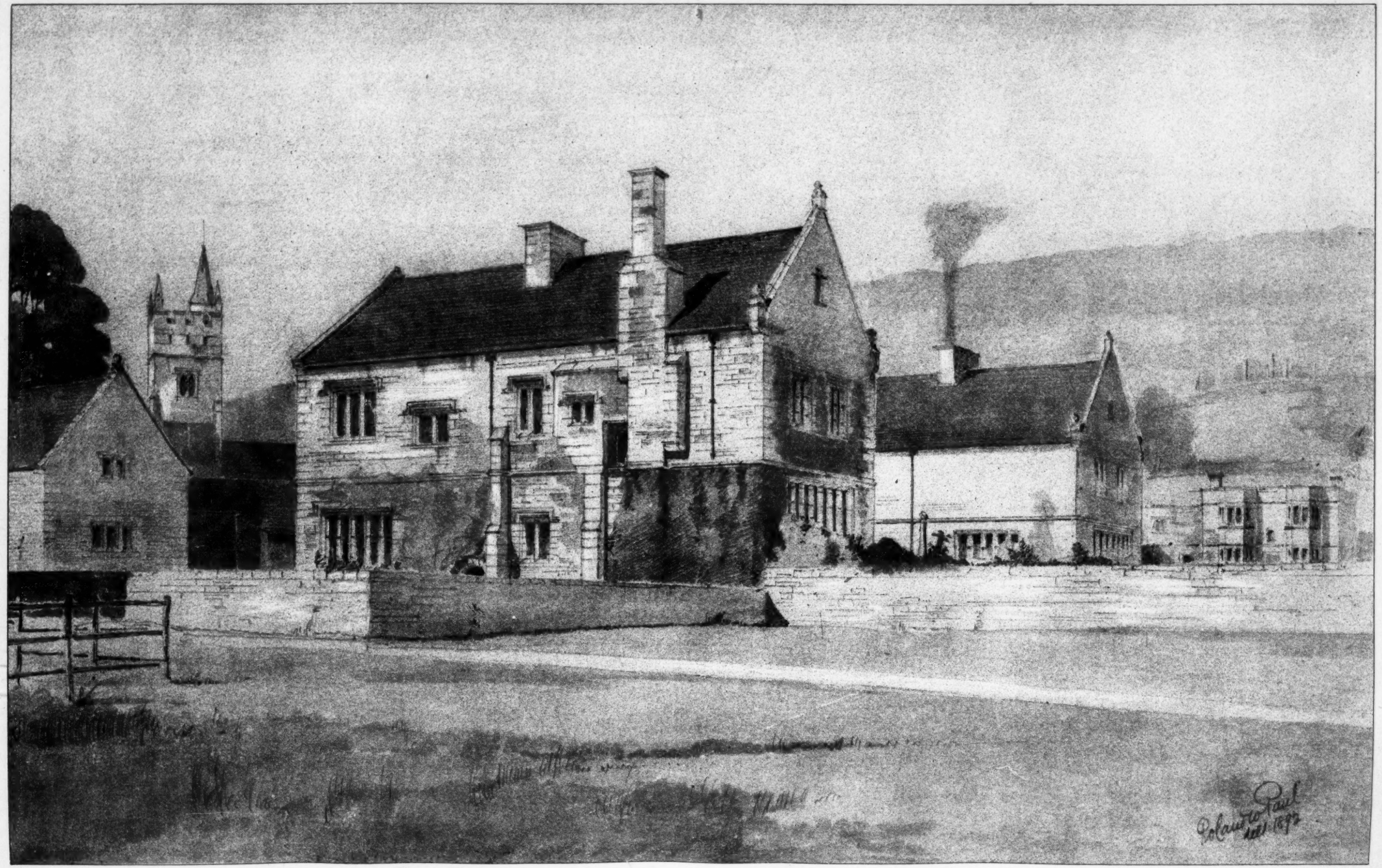

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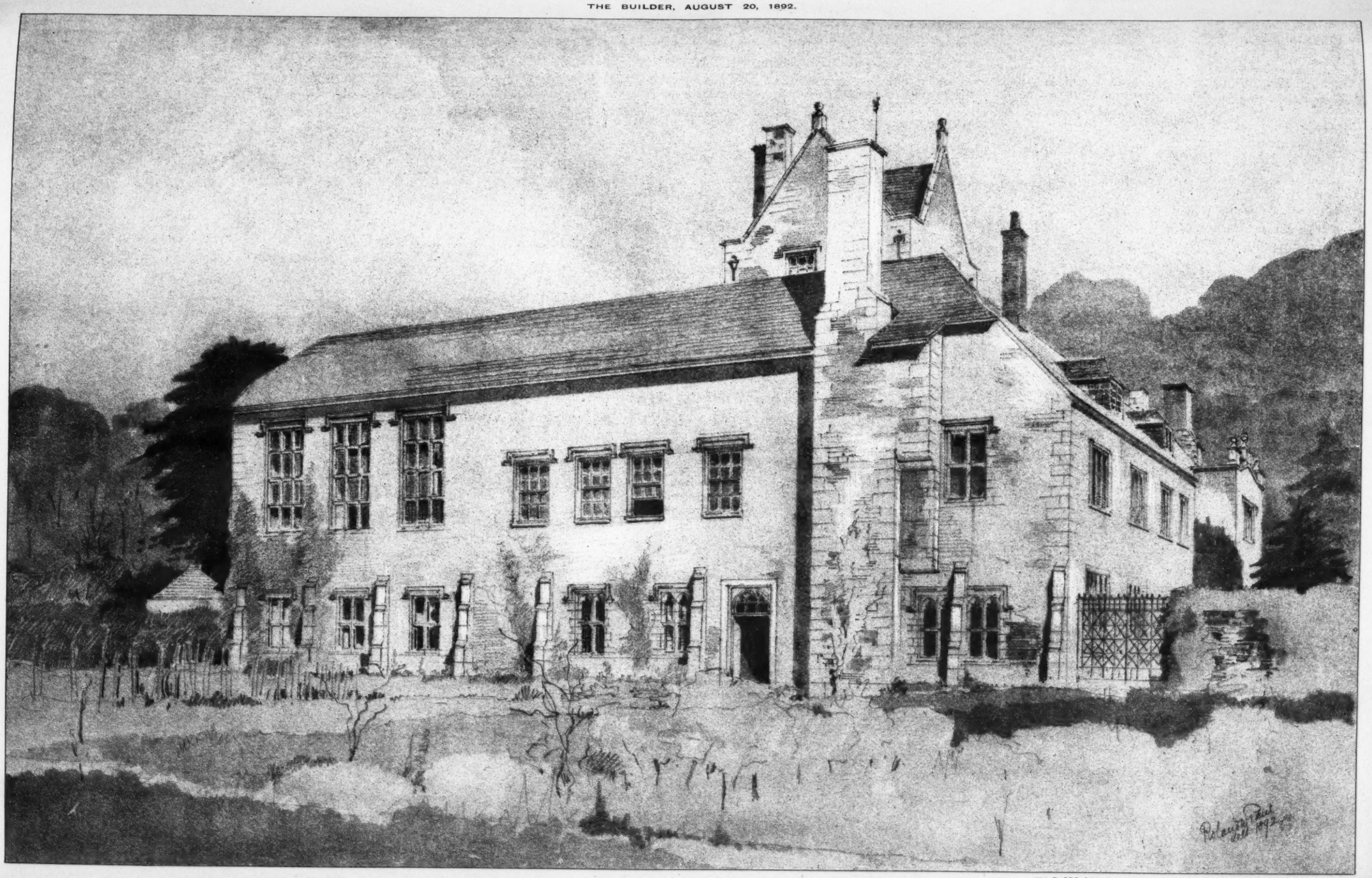

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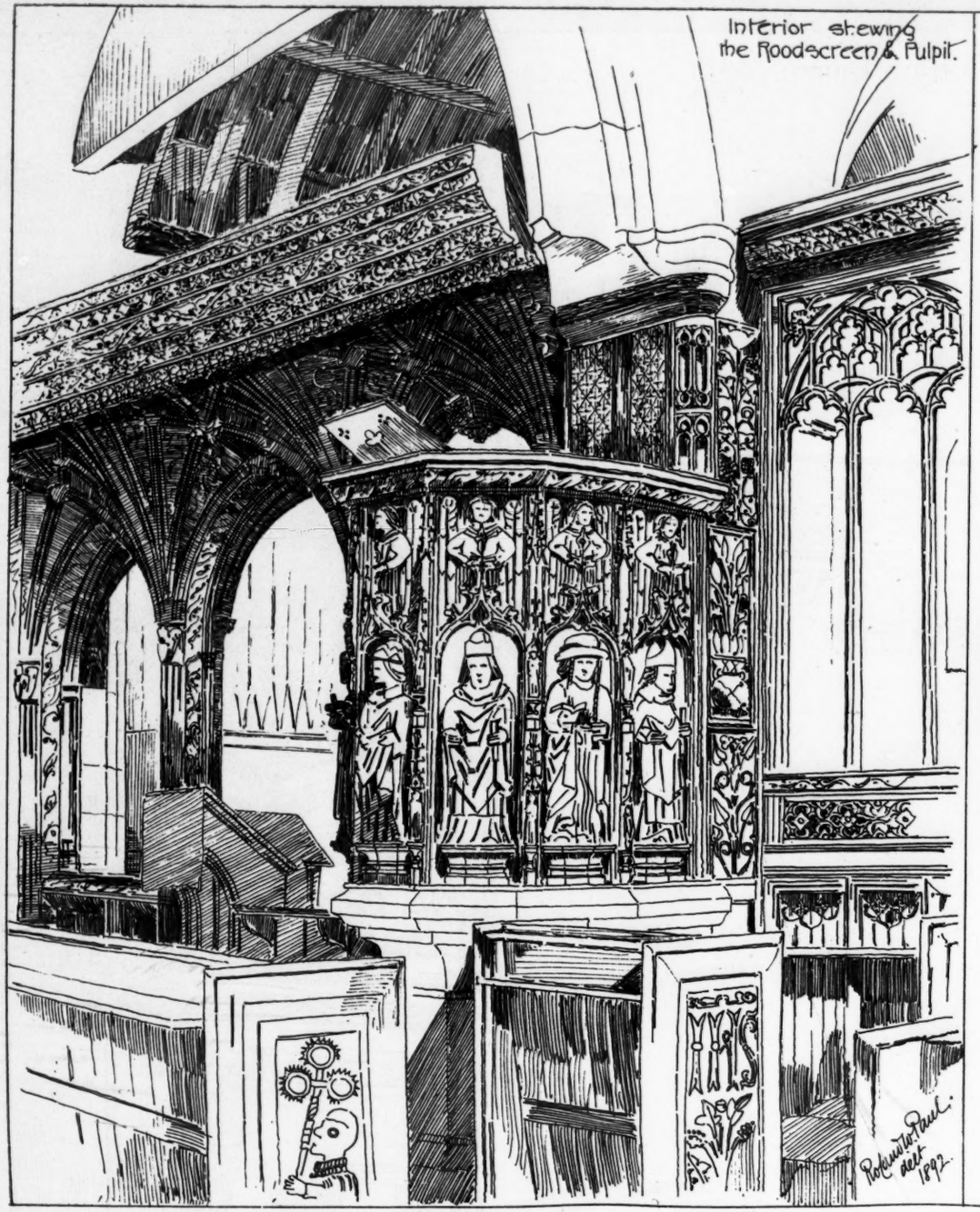
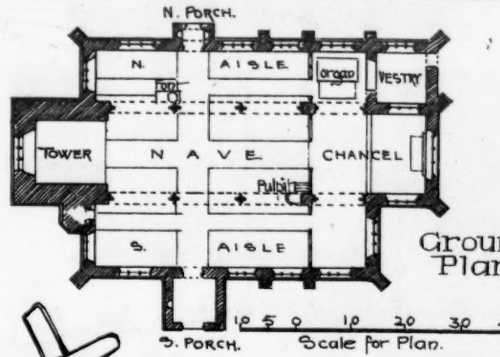
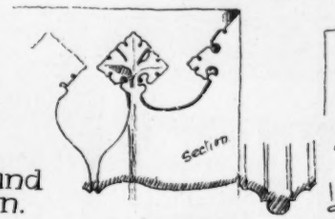




Ground Plan.

Trull Church, Somerset.



Linen panels from Side Screens.

Stained Glass in window on South side of Chancel.

St Margaret.

St George.

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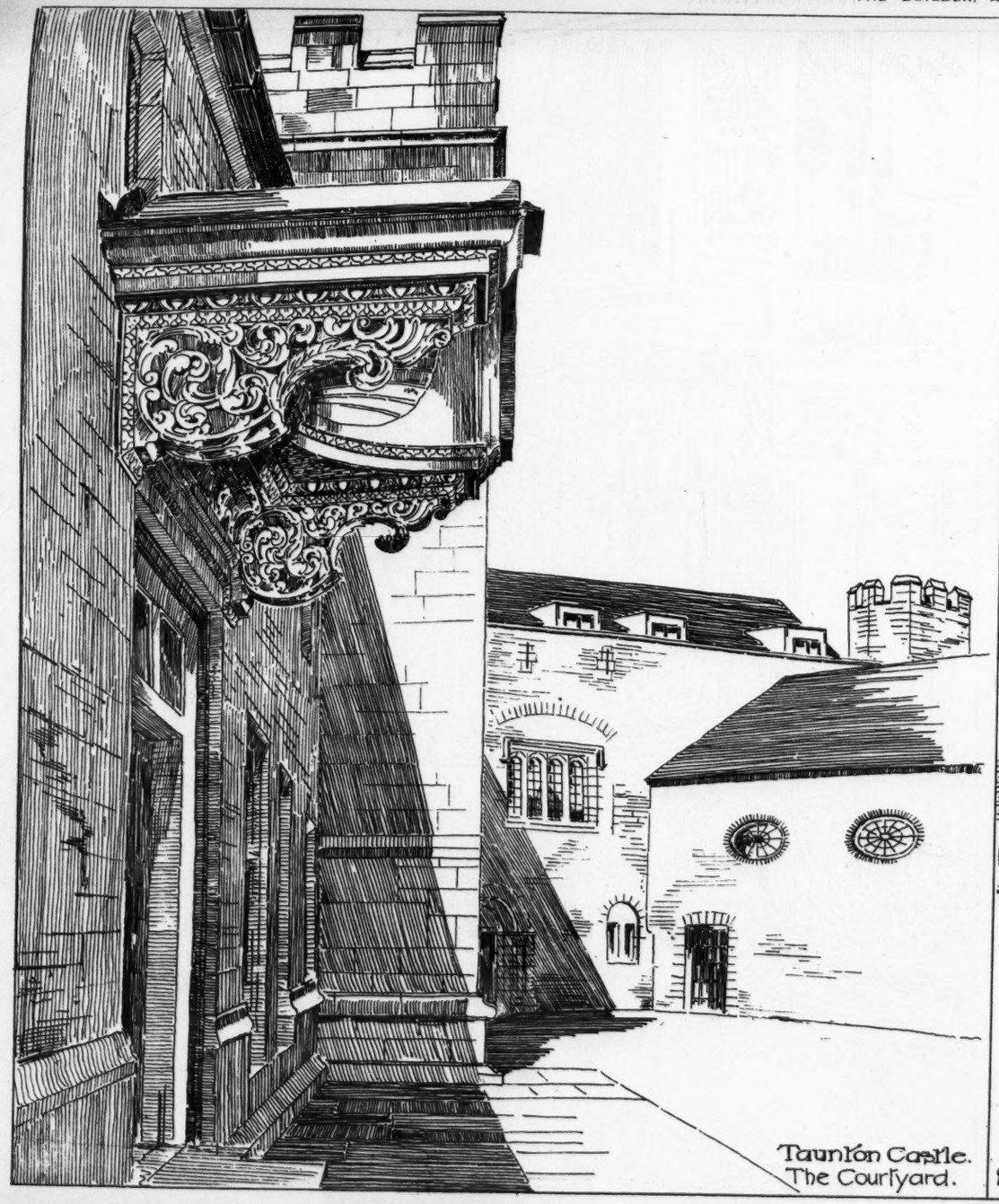
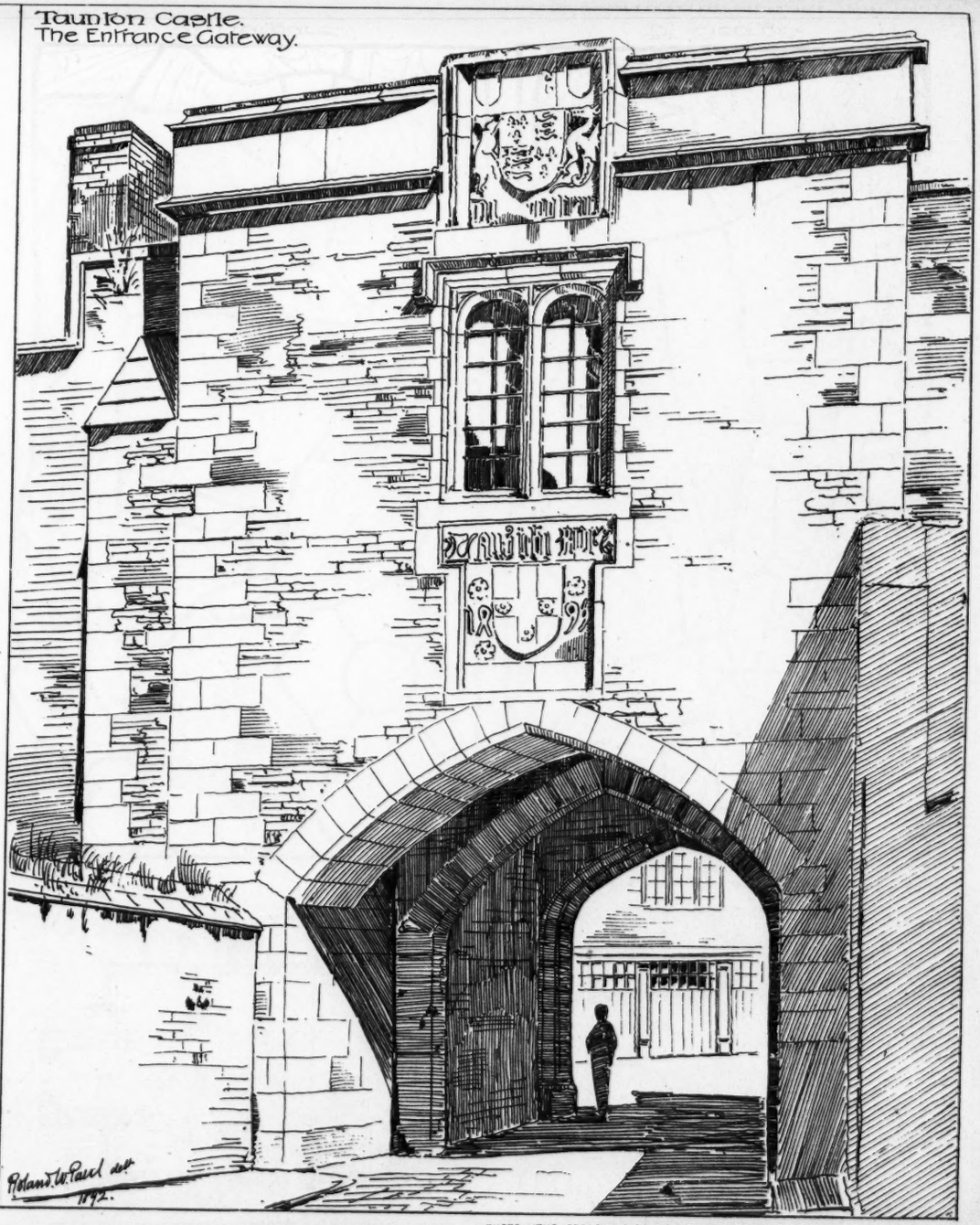


Taunton Castle.
The Courtyard.



Taunton Castle.
The Entrance Gateway.

Roland W. Paul del. 1892.

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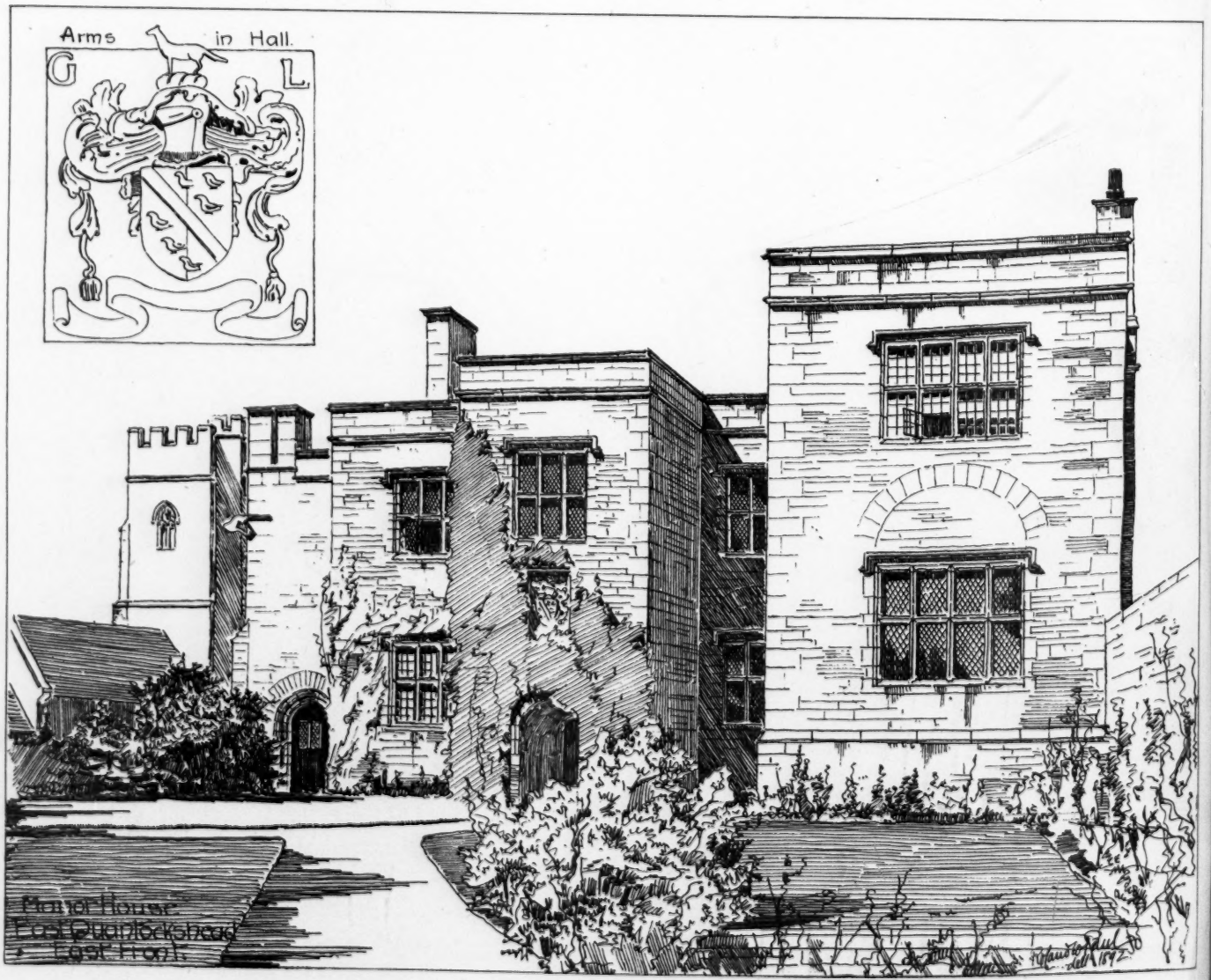
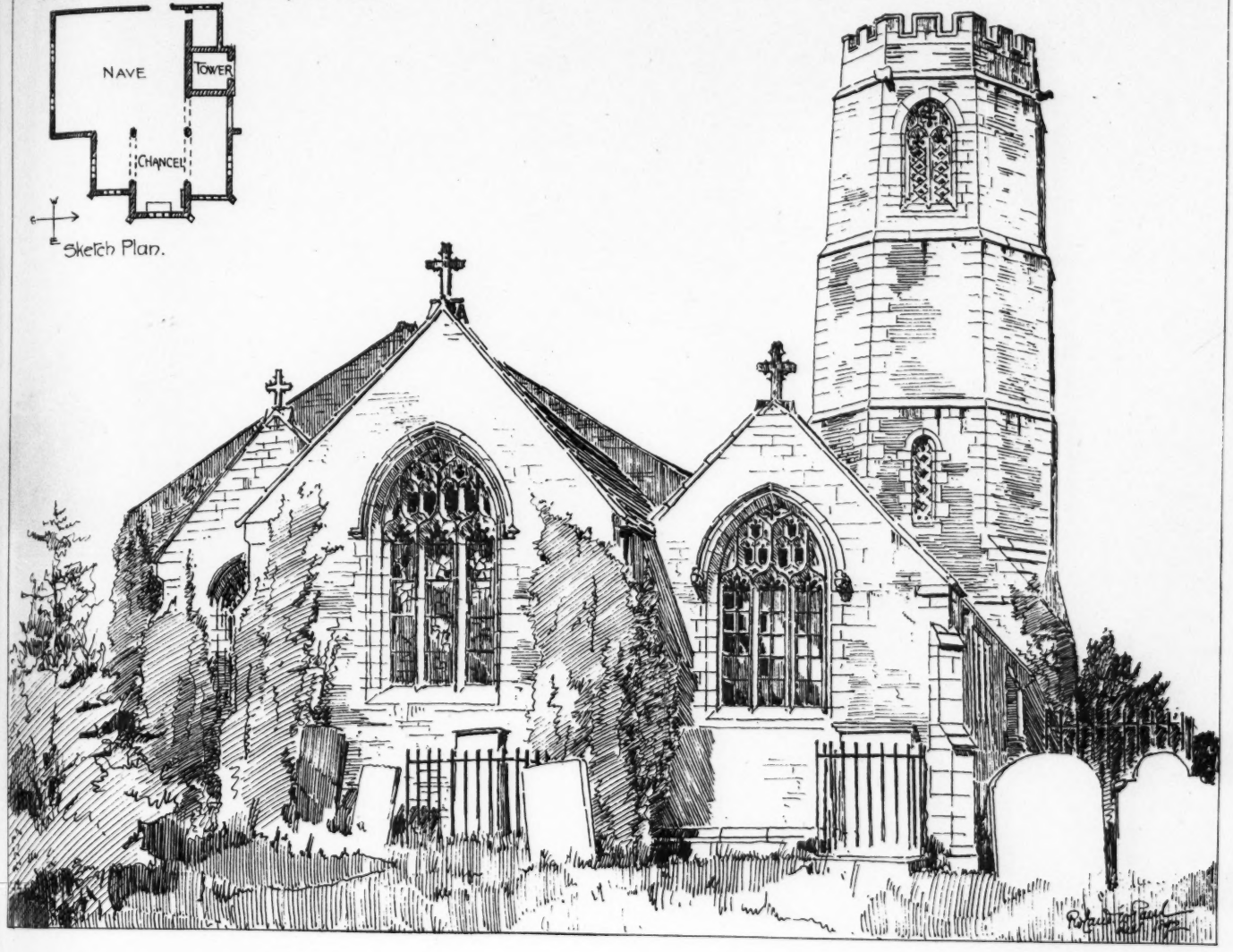
East Quantockshead
View from N.W.



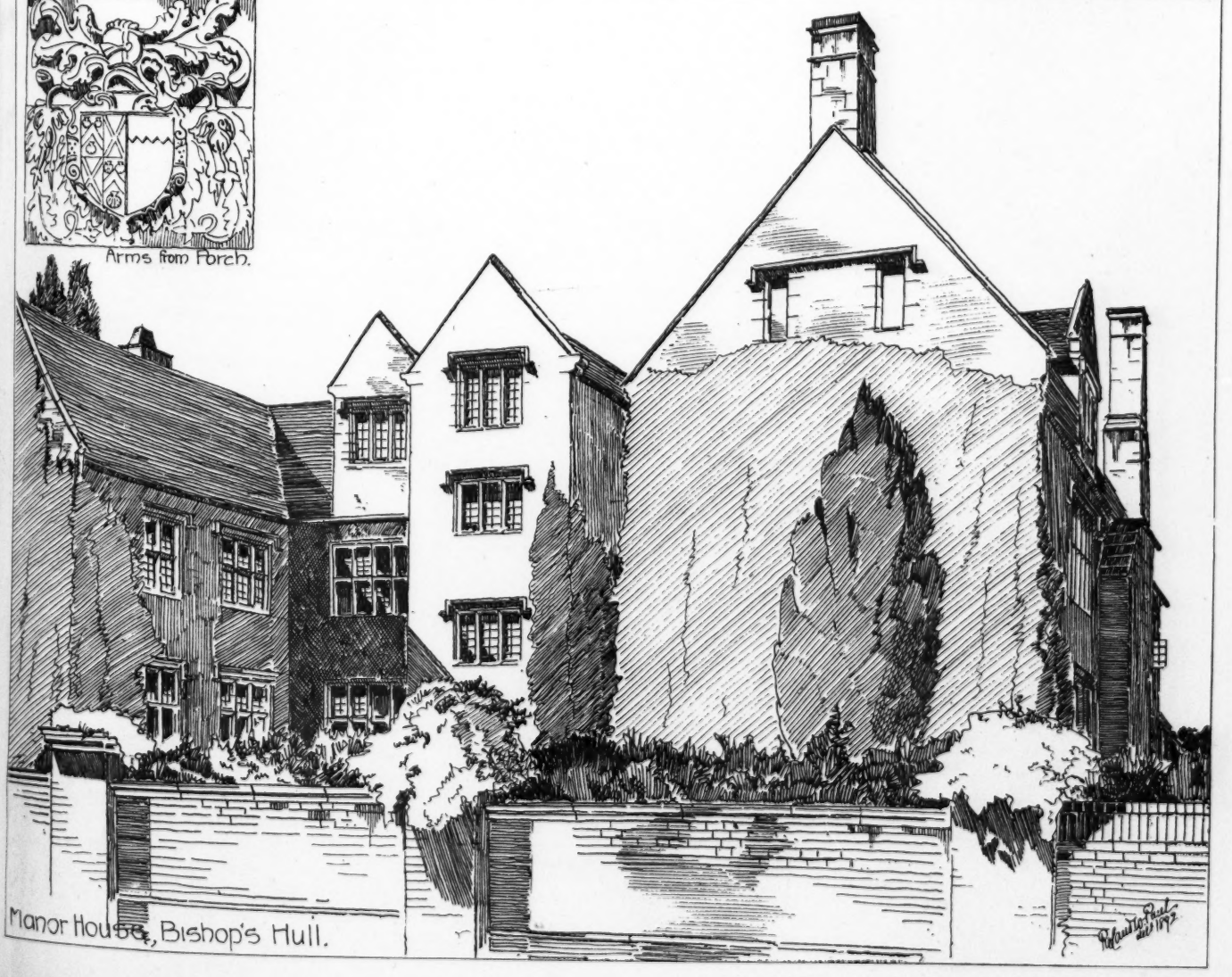
Manor House
East Quantockshead
East Front.

The Church, Bishop's Hull.

Sketch Plan.



Arms from Porch.



Manor House, Bishop's Hull.

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